WAR DEPARTMENT TECHNICAL MANUAL

TM11-265

RADIO SET AN/PRC-5

WAR DEPARTMENT 21 JUNE 1944

WAR DEPARTMENT,

WASHINGTON 25, D. C., 21 JUNE 1944.

TM 11-265, Radio Set AN/PRC-5, is published for the information and guidance of all concerned.

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BY ORDER OF THE SECRETARY OF WAR:

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X

(For explanation of symbols see FM 21-6.)

WARNING

HIGH VOLTAGE

is used in the operation of
this equipment.

DEATH ON CONTACT

may result if operating personnel
fail to observe safety precautions.

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DESTRUCTION NOTICE

WHY - To prevent the enemy from using or salvaging this equipment for his own benefit.

WHEN- As ordered by your commander.

HOW - 1. Smash - Use any heavy instrument at hand.

2. Cut - Use any sharp instrument at hand.

3. Burn - Use gasoline, kerosene, oil, any incendiary material at hand.

4. Explosives - Use firearms.

5. Disposal - Obliterate: bury, scatter, or throw into any body of water.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT- 1. Smash - Receiver, transmitter, antenna, power transformer, crystals, tubes, headphones, telegraph key, resistors, capacitors, coils, switches, etc.

2. Cut - Wiring and line cords.

3. Burn - Capacitors, canvas bags and equipment receptacles in carrying case.

4. Bury or scatter - Any or all of above pieces.

DESTROY EVERYTHING

SAFETY NOTICE

THIS EQUIPMENT USES DANGEROUSLY HIGH VOLTAGES. DO NOT CHANGE VACUUM TUBES OR MAKE CHANGES INSIDE OF THE TRANSCEIVER UNIT WITH THE POWER PLUG PLUGGED INTO A POWER SOURCE, EXCEPT AS SPECIFICALLY DIRECTED IN THIS MANUAL.

A MODERATELY HIGH VOLTAGE IS PRESENT ACROSS THE TWO SIDES OF THE KEY. IT IS NOT LIKELY THAT EXPOSURE TO THIS VOLTAGE WILL BE FATAL BUT IT WILL CAUSE A PAINFUL SHOCK UNDER CERTAIN CONDITIONS. DO NOT TOUCH BOTH SIDES OF THE KEY WITH THE EQUIPMENT IN OPERATION; DO NOT TOUCH ONE SIDE OF THE KEY AND THE CHASSIS AT THE SAME TIME.

THE PLUG-IN COILS OF THE TRANSMITTER ARE ISOLATED FROM THE HIGH-VOLTAGE SOURCE BUT THEY CAN CAUSE PAINFUL RADIO-FREQUENCY BURNS IF TOUCHED WHILE THE EQUIPMENT IS IN OPERATION AS A TRANSMITTER.

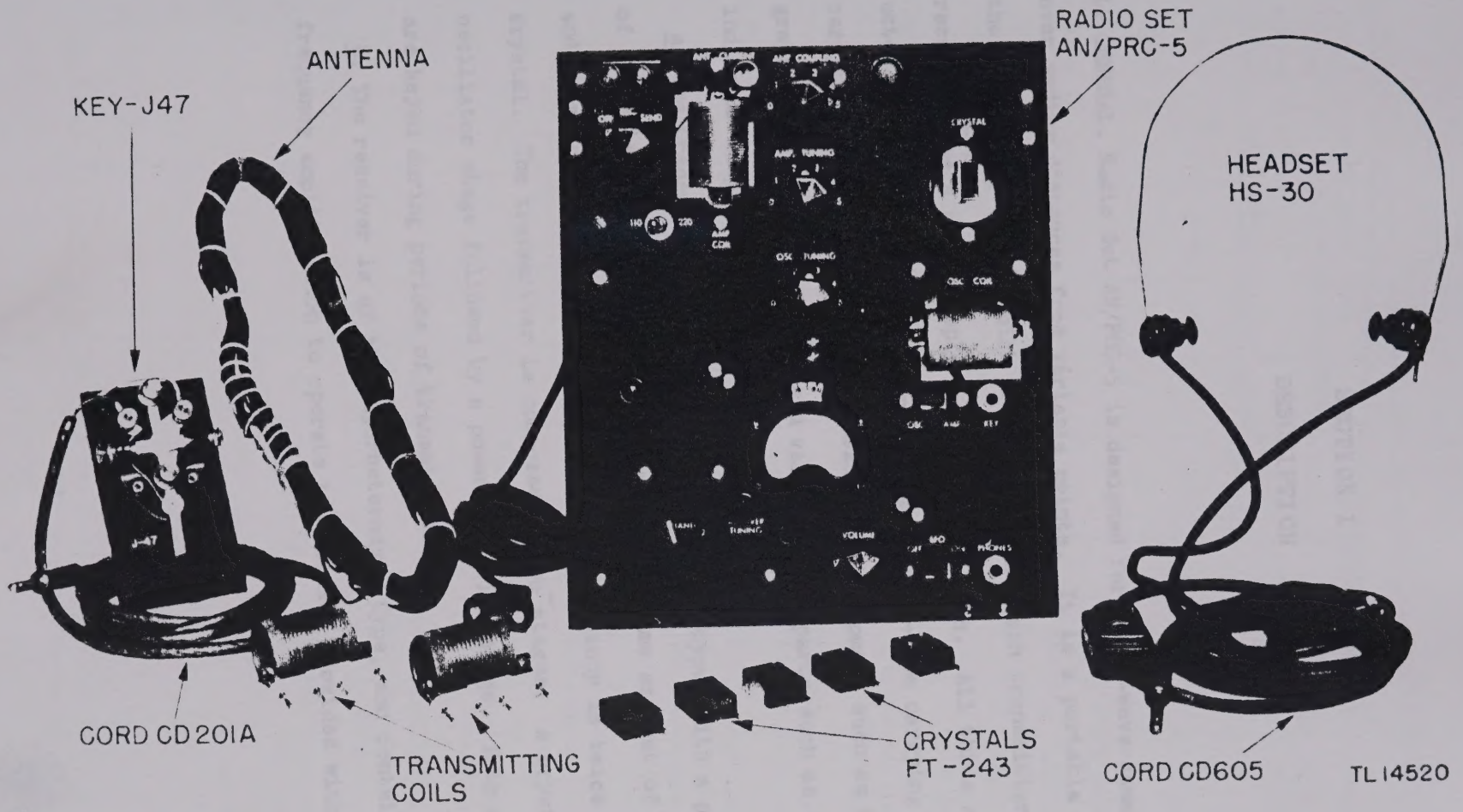

Figure 1. Radio Set AN/PRC-5, front panel and operating components.

SECTION I

DESCRIPTION

1. GENERAL. Radio Set AN/PRC-5 is designed for short-wave communication over medium distances from variable points. It is a portable transceiver, the component parts of which are a radio telegraph transmitter, a radio receiver, and a power-supply unit common to both. All three are constructed in one unit which is mounted in a luggage-type carrying case. The carrying case also houses other associated equipment such as the telegraph key, headset, antenna, and various spare parts such as fuses, indicator lamps, and vacuum tubes.

a. The transmitter is of the radio-telegraph type, with a power output of 16 watts when the output frequency is the same as that of the crystal, and an output of 10 watts when the output frequency is twice that of the crystal. The transmitter is composed of two stages: a crystal-controlled oscillator stage followed by a power-amplifier stage. Both of these stages are keyed during periods of transmission.

b. The receiver is of the superheterodyne type, and contains enough audio-frequency amplification to operate the headset provided with the equipment.

2. TABLE OF COMPONENTS.

Quantity	Name of component	Dimensions (in.)					
		Height	Width	Depth	Length	Diam	Unit weight (lb)
1	Antenna	--	--	--	1800	1/16	0.4
5	Adapters, plug-in, socket power	--	--	--	--	--	0.05
6	Crystals, mounted in Ft-243 holders, one ea. 4635, 5263, 5925, 6525, 7150, and 7825 kc	1-3/16	7/8	7/16	--	--	0.04
1	Case, portable luggage type	--	--	--	--	--	Variable
1	Cord CD-201-A, for key, with Plug PL-55	--	--	--	40	0.3	0.2
1	Cord CD-605, for headset, with Transformer C-410 and Plug PL-55	--	--	--	72	0.22	0.6
1	Headset HS-30 (less cord, transformer, and plug)	--	--	--	--	--	0.15
1	Key J-47, radio telegraph	1-1/8	2-3/4	5-3/8	--	--	0.6
1	Radio receiver and transmitter, Radio Set AN/PRC-5 Includes: 1 set of vacuum tubes as follows: Quantity — JAN type 2 — 6SK7 1 — 6SA7 1 — 6SR7 1 — 6N7	11.0	10.0	4-1/8	--	--	15.0

Quantity	Name of component	Dimensions (in)					
		Height	Width	Depth	Length	Diam	Unit weight (lb)
	Quantity / JAN type 1 6V6 1 6L6 1 5Z4 and also 4 Plug-in type coils for transmitter 1 Pilot Lamp P1 1 Pilot Lamp P2						
2	Technical Manuals 11-265, Radio Set AN/PRC-5	9.0	5-7/8	—	—	—	0.25
1	Set of vacuum tubes, running spares, as follows: Quantity / JAN type 2 6SK7 1 6SA7 1 6SR7 1 6N7 1 6V6 1 6L6 1 5Z4	—	—	—	—	—	0.1

3. TOTAL WEIGHTS. The transceiver unit alone weighs 15 pounds. The complete assembly, including the carrying case and associated operating components and spare parts, weighs approximately 25 pounds (subject to slight variation).

4. FREQUENCY COVERAGE.

a. The transmitter covers 4,000 to 16,000 kilocycles in four bands:

(1) 4,000 to 6,000 kilocycles.

(2) 6,000 to 8,000 kilocycles.

(3) 8,000 to 12,000 kilocycles.

(4) 12,000 to 16,000 kilocycles.

b. The receiver covers 4,500 to 16,000 kilocycles in two bands:

(1) 4,500 to 8,000 kilocycles.

(2) 8,000 to 16,000 kilocycles.

5. SOURCE OF POWER (fig. 1). The equipment is designed for operation from a 110- or 220-volt, 50- to 60-cycle, single-phase source. The equipment is set for operation from a source of either voltage by manipulation of the switch marked 110-220, located near the FUSE receptacle in the upper left-hand corner of the transceiver unit.

CAUTION: THIS EQUIPMENT IS DESIGNED FOR OPERATION FROM 110-VOLT OR 220-VOLT, 50- TO 60-CYCLE A-C POWER ONLY. IF OPERATION IS ATTEMPTED ON A D-C POWER SOURCE OR ON AN A-C SOURCE OF WIDELY DIFFERENT VOLTAGE AND FREQUENCY, THE EQUIPMENT MAY BE PERMANENTLY DAMAGED.

6. POWER INPUT. The line currents and power consumption are as follows:

Item	110 volts	220 volts
Line current (receiver on)	0.51 ampere	0.25 ampere
Line current (transmitter on) No load	0.55 ampere	0.30 ampere
Line current (transmitter on) Full load	0.86 ampere	0.46 ampere
Power input (receiver on)	41.0 watts	46.0 watts
Power input (transmitter on) No load	45.0 watts	51.0 watts
Power input (transmitter on) Full load	78.0 watts	84.0 watts

7. TRANSCEIVER (fig. 1). The transmitter and the power supply form the upper half of the transceiver unit, and the receiver forms the lower half. All of the controls for the transceiver unit are mounted on a single panel covering the face of the unit (fig. 1).

a. Power Supply. The power supply portion of the transceiver unit supplies all operating voltages for both the transmitter and receiver portions of the unit. It consists of a power transformer, a full-wave vacuum-tube rectifier, and a capacitor-input filter consisting of three capacitors (two in series) and one choke coil.

(1) The 110-220 toggle selector switch on the upper left-hand side of the transceiver panel permits operation on either 110-volt or 220-volt, 50- to 60-cycle a-c power source. The power transformer has two 110-volt primary windings. The toggle selector switch connects the two primary windings in parallel for operation from a 110-volt power line, and connects them in series for operation from a 220-volt line.

(2) A fuse, located on the upper left-hand side of the transceiver panel in the holder marked FUSE, is connected between one side of the power input cord and the primary circuit of the power transformer for protection of the equipment from short circuits or accidental overloads.

(3) The green pilot light, located immediately below the FUSE receptacle and the 110-220 toggle switch, is connected across one of the filament windings of the power transformer, and lights when the transformer is energized.

(4) The power cord, which is permanently attached to the transceiver unit, may be adapted for use with various types of power outlet sockets by means of the adapters furnished with the equipment (par. 2).

(5) The OFF-REC-SEND switch, located above the FUSE holder and the 110-220 switch near the upper left-hand corner of the panel, disconnects the primary circuit of the power transformer from the power cord in the OFF position, causes power to be applied to the receiver in the REC position, and causes power to be applied to the transmitter in the SEND position. The filaments of the vacuum tubes in both the receiver and the transmitter circuits are energized at both the REC and SEND positions of the switch. In addition to the above functions, this switch also transfers the antenna connection from the receiver to the transmitter, and vice versa.

(6) The GND and ANT binding posts, located in the upper left-hand corner of the panel, provide a means of connecting the ground and antenna leads to the transceiver unit.

b. Transmitter. The transmitter portion of the transceiver unit consists of a two-tube (crystal-controlled master oscillator followed by a power-amplifier stage), four-band circuit arrangement covering a frequency range of 4,000 to 16,000 kilocycles.

(1) A change from one band to another is accomplished by inserting the proper crystal and the oscillator and power-amplifier coil units into their proper receptacles on the front panel. The oscillator and amplifier coil units are completely interchangeable with each other, and the operating circuits have been designed so that only four coils are required to cover the entire range of the transmitter (par. 20c).

(2) The following transmitter controls and receptacles are located on the front panel of the transceiver unit (fig. 2):

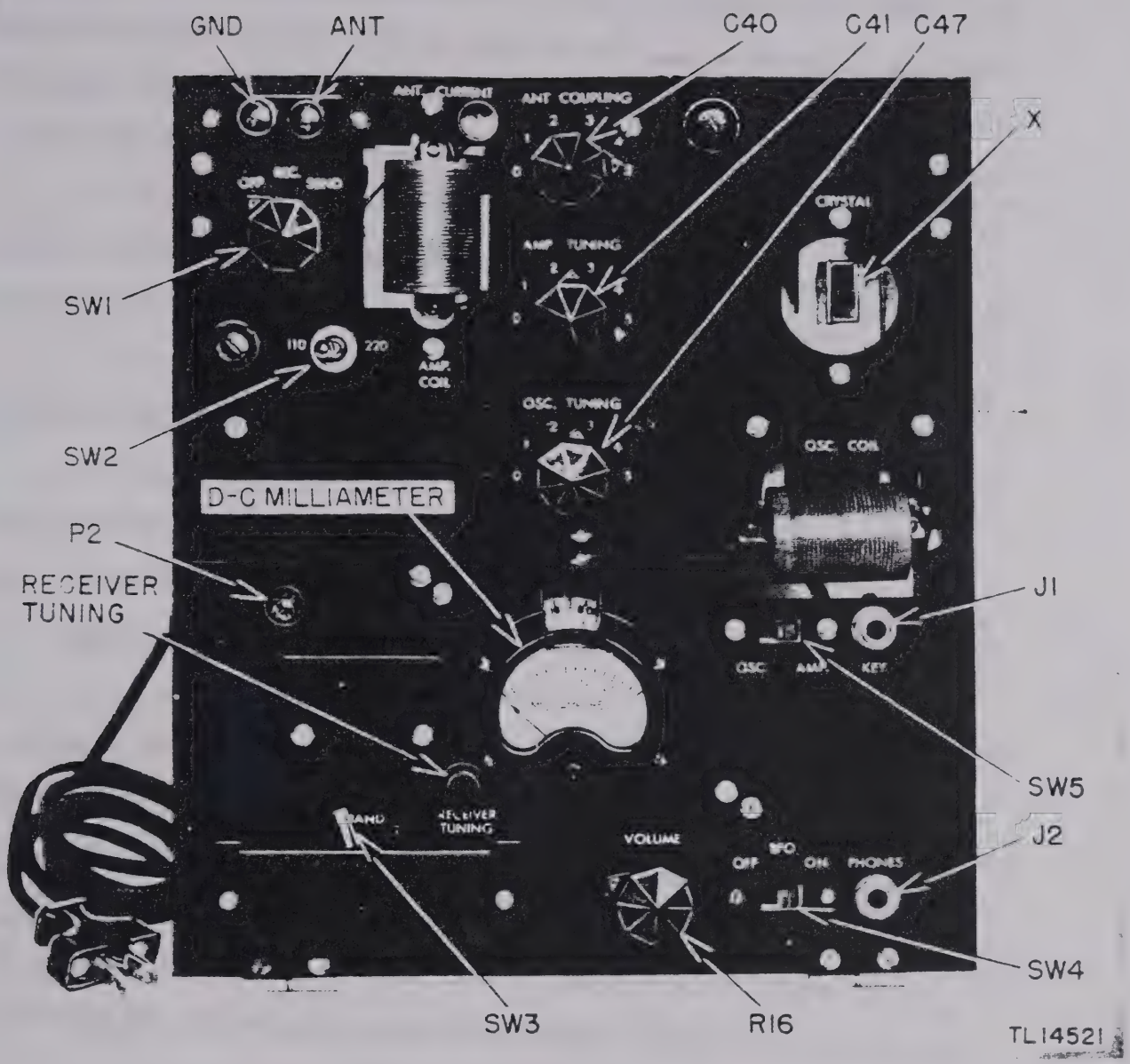

Figure 2. Radio Set AN/PRC-5, front panel details.

(a) ANT CURRENT. An indication of transmitter antenna current is provided by a pilot lamp connected in series with the transmitter antenna lead. This lamp is installed near the top edge of the transceiver unit behind the clear jewel indicator. This lamp is shunted by a small inductor which will maintain operation of the transceiver unit in the event of failure of the lamp filament.

(b) AMP COIL. This receptacle, located immediately below the ANT CURRENT indicator, receives the power-amplifier plate coil required for operation at a given frequency.

(c) OFF-REC-SEND Switch. Refer to subparagraph a(5) above for a description of this switch.

(d) ANT COUPLING. This control, located at the top-center portion of the transceiver unit, provides a means of adjusting the antenna loading capacitor and, in turn, the load on the transmitter power-amplifier circuits (pars. 22d and e).

(e) AMP TUNING. This control, located below the ANT COUPLING control, provides a means of tuning the power-amplifier plate circuit to resonance. The tuning capacitor controlled by this knob is similar to that used in the ANT COUPLING control.

(f) OSC TUNING. This control, located below the AMP TUNING control, is attached to the oscillator plate circuit tuning capacitor, and provides a means of bringing this circuit into resonance.

(g) CRYSTAL. This receptacle, located near the upper right-hand corner of the panel, receives the crystal unit required for operation on a given frequency. Six crystals are furnished with the unit, and the frequency of each is marked directly on the crystal holder (par. 2).

(h) OSC COIL. This receptacle, located immediately below the CRYSTAL receptacle, receives the oscillator plate coil required for operation at a given frequency.

(i) OSC-AMP Switch. This slide-type switch, located below the OSC COIL receptacle, provides a means of switching the d-c milliammeter, located below the receiver tuning dial, from the oscillator cathode circuit to the power-amplifier cathode circuits or vice versa. In the OSC position of this switch, the cathode current of the oscillator tube is indicated by the meter. In the AMP position, the cathode current of the power-amplifier tube is indicated.

(j) KEY Jack. This jack, located below the OSC COIL receptacle and to the right of the OSC-AMP switch, receives Plug PL-55 on the end of the cord attached to Key J-47.

c. Receiver. The receiver portion of the transceiver unit consists of a five-tube superheterodyne circuit arrangement, with automatic volume control (avc), a beat-frequency oscillator, and a frequency range of 4,500 to 16,000 kilocycles covered by two bands. The beat-frequency oscillator is provided for the reception of c-w signals. When the reception of voice- or tone-modulated signals is desired, this oscillator may be switched off as described below (subpar. c(4)). The following receiver controls (fig. 2) are located on the lower portion of the transceiver unit:

(1) RECEIVER TUNING. The RECEIVER TUNING control, located to the left of the d-c milliammeter in the center of the panel, controls the 3-gang variable tuning capacitor in the receiver circuits as well as the calibrated dial which is visible in the small window directly above the d-c milliammeter. This dial is calibrated directly in megacycles (mc), with

band 2 (8.0 to 16.0 mc) on the top portion of the dial, and band 1 (4.5 to 8.0 mc) on the bottom portion.

(2) BAND SWITCH. The BAND change switch, located in the lower left-hand corner of the panel, has two positions marked 1 and 2. The frequency ranges covered in these two positions are as follows: position 1: 4,500 to 8,000 kilocycles; position 2: 8,000 to 16,000 kilocycles. The BAND switch is protected by a rectangular cover fastened to the panel by screws. Underneath this cover are several adjustment screws used in aligning the receiver circuits. Immediately above the BAND switch is another square cover plate over trimmer capacitor adjustment screws also used in aligning the receiver circuit. For the location of these adjustments refer to figure 6.

(3) VOLUME CONTROL. The receiver VOLUME control, located to the right and below the d-c milliammeter, controls the amount of a-f voltage fed to the grid of the first audio-amplifier stage and the level of sound in the headset.

(4) BFO OFF-ON SWITCH. This switch, located to the right of the VOLUME control and immediately below the OSC-AMP switch, controls the operation of the beat-frequency oscillator by opening or closing its plate voltage circuit.

(5) PHONES JACK. The PHONES jack, located in the bottom right-hand corner of the panel immediately below the KEY jack, receives Plug PL-55 attached to the end of the headset cord.

8. CARRYING CASE. The transceiver assembly is mounted on slip-hinges in a luggage-type carrying case, and it is held in place in the case by a spring-tension latch. Folding-type brackets on the two sides of the trans-

ceiver unit are attached to the side walls of the transceiver compartment of the carrying case to permit tilting of the transceiver unit for greater convenience in operating. The antenna wire, with one insulator attached, is wound on blocks, attached to the inside of the carrying-case lid, for carrying purposes only. Several canvas bags attached to the inside of the carrying case, at several convenient points, house Headset HS-30, Key J-47, the extra crystal and transmitter coil units, and spare fuses, pilot lamps, and tubes.

9. HEADSET (fig. 1). Headset HS-30, furnished with the equipment, plugs into the PHONES jack on the transceiver unit by means of Plug PL-55 attached to the end of headset Cord CD-605. The 256-ohm primary winding of Transformer C-410 is connected to the headset, and the 8,000-ohm secondary winding is connected to the receiver output by means of the complete headset and cord assembly.

10. KEY (fig. 1). Key J-47, furnished with the equipment, plugs into the KEY jack on the transceiver unit by means of Plug PL-55 attached to the end of Cord CD-201-A.

11. ANTENNA. The antenna consists of a 150-foot length of flexible insulated wire. The antenna is equipped with a small airplane-type insulator and a 20-foot length of chalk-line cord for attachment of the remote end of the antenna wire to a suitable support. When the equipment is being transported, the antenna wire is coiled around blocks attached to the lid of the carrying-case (par. 8).

12. VACUUM TUBES. The vacuum tubes used in Radio Set AN/PRC-5 are shown in the following tabulation:

Reference	Function	Signal Corps type	JAN type	Base
V1	Receiver r-f amplifier	VT-117	6SK7	Octal
V2	Receiver converter	VT-150	6SA7	Octal
V3	Receiver i-f amplifier	VT-117	6SK7	Octal
V4	Receiver detector and BFO	VT-233	6SR7	Octal
V5	Receiver a-f amplifier stages	VT-96	6N7	Octal
V6	Transmitter crystal oscillator	VT-107	6V6	Octal
V7	Transmitter power-amplifier	VT-115	6L6	Octal
V8	Full wave rectifier	VT-74	5Z4	Octal

13. ADAPTERS. A set of five adapters is furnished so that the plug on the end of the power cord may be adapted to fit into various types of power outlet sockets that may be encountered while using the equipment.

14. CRYSTALS (fig. 1). A set of six crystals, mounted in FT-243 holders, are furnished with the equipment. These crystals permit fundamental frequency operation on the following frequencies: 4635; 5263; 5925; 6525; 7150; and 7825 kilocycles. The crystals also permit operation at the second harmonic frequencies of the crystals as follows: 9270; 10,526; 11,850; 13,050; 14,300; and 15,650 kilocycles.

15. TRANSMITTER PLUG-IN COILS (fig. 1). A set of four transmitter coil units is furnished with the equipment. These coils are wound on clear phenolic forms attached to a ceramic plug strip having four pin-type plugs. The coils plug into ceramic jack strips installed in the trans-

ceiver unit. Identification of the four coils is marked on the bottom of the ceramic plug strip; two coils are marked Band D and one each Band B and Band C. All of the coils are completely interchangeable so far as insertion into the jack strips is concerned.

16. OPERATING SPARES. The operating spare parts, housed in canvas bags attached to the inside of the carrying case, are as follows:

a. A complete duplicate set of vacuum tubes as listed in paragraph 12.

b. Two spare fuses, 2-ampere, 250-volt type.

c. One antenna loading indicator pilot lamp, 0.06-ampere, 2-volt type, with bayonet base.

d. One power indicating pilot lamp, 0.15-ampere, 6- to 8-volt type, with bayonet base.

SECTION II

INSTALLATION AND OPERATION

17. INITIAL PROCEDURE.

a. Unpack the box which contains Radio Set AN/PRC-5 and check to see that the following items are included:

(1) The transceiver unit with fuse, pilot lights, and a set of vacuum tubes installed; mounted in a portable luggage-type carrying case.

(2) One complete set of spare tubes (pars. 12 and 16).

(3) One Headset HS-30.

(4) One Key J-47.

(5) One set of six crystals (par. 14).

(6) One set of four transmitting coils (par. 15).

(7) Two spare fuses (par. 16).

(8) Two spare pilot lamps (par. 16).

(9) One set of five socket adapters (par. 13).

(10) One antenna, wound on blocks inside of carrying-case cover (par. 11).

(11) Two copies of Technical Manual TM 11-265, Radio Set AN/PRC-5.

b. Inspect the equipment for any damage that may have occurred in transit.

c. In order to make sure that each vacuum tube is seated firmly in its socket, it will be necessary to remove the transceiver unit from the carrying case. To do this proceed as follows:

(1) Release the spring-tension latch holding the top end of the transceiver unit and raise the top end of the transceiver unit as far as possible (tilt it up).

(2) Disengage the folding brackets, which hold the transceiver unit, from the heads of the holding screws in the side walls of the transceiver

compartment.

(3) Lift the transceiver unit still further and slip it off the slip-hinges attached to the bottom edge of the transceiver unit and the front edge of the carrying case.

(4) Inspect the interior portion of the unit for possible damage during shipment and make sure that all vacuum tubes are seated firmly in their correct sockets. Make sure that the pilot lamps have been installed in their proper positions.

(5) Replace the transceiver unit on the slip-hinges.

(6) Lower the unit carefully until the folding brackets can be reinstalled properly, and engage the lower ends of the brackets with the heads of the holding screws.

(7) If immediate operation of the equipment is desired, the transceiver unit may be left in this tilted position for convenience in operating. If the equipment is to be carried or stored, lower the transceiver unit until the spring-tension latch engages the top edge of the unit.

18. INSTALLATION OF ANTENNA. Unwind the antenna wire from the supporting blocks attached to the inside of the lid of the carrying case, and attach the end with the insulator to a suitable support by means of the cord attached to the insulator. For best results, this end of the antenna should be as high as possible above the earth and surrounding buildings or other objects. Under certain conditions it may not be possible to install the antenna in such a manner. Under such conditions it may be necessary to coil the antenna wire around the molding in a room or to drop as much as possible of its total length out of a window. No hard and fast rules can be given for the installation of the antenna under such conditions, and

successful operation of the equipment will depend on the skill and ingenuity of the operator. Remember that the entire length of the antenna should be in free space so far as physically possible. If it is necessary to support the wire at points along its length, these additional points of support should be insulated as well as possible either by supporting the wire with pieces of cord or rope or by tying the wire to wooden objects. Do not attach the wire directly to metal objects. Attach the other end of the antenna wire to the binding post marked ANT, located in the upper left-hand corner of the transceiver unit. If a good ground connection such as a water pipe is available, connect the GND post which is adjacent to the ANT post to the pipe by means of a short length of wire (not furnished with the equipment).

19. POWER LINE CONNECTION (fig. 2). Determine the voltage and the frequency of the source of power to be used. For Radio Set AN/PRC-5 to operate properly, the line frequency must be between 50 and 60 cycles and the line voltage must be between 110 and 120 volts or between 220 and 240 volts. Then proceed as follows:

a. Throw the OFF-REC-SEND switch (SW1) to the OFF position.

b. Throw the 110-220 toggle switch (SW2) to the position corresponding to the voltage of the available power source.

c. Determine what adapter is needed, if any, to connect the power cord to the power outlet, and fit the adapter on the power cord plug.

d. Connect the power cord to the power outlet.

20. TRANSMITTER CRYSTAL AND COIL UNITS (fig. 2).

a. Crystal. The frequency of each crystal is marked on the outside of Crystal Holder FT-243. Select the crystal of the desired operating

frequency, or one-half the value of the desired output frequency (par. 14), and insert it in the CRYSTAL receptacle near the upper right-hand corner of the transceiver panel.

b. Transmitter Coils. Four transmitting coils (L12 and L14) are furnished with Radio Set AN/PRC-5 (par. 15). To operate on a given frequency, determine the coils required for operation at that frequency from the following table, and insert the coils selected in the OSC COIL and AMP COIL receptacles, respectively.

c. Frequency-coil Table.

Output frequency (mc)	Crystal frequency (mc)	Oscillator coil	Amplifier coil
4.0 to 6.0	4.0 to 6.0	Band C	Band B
6.0 to 8.0	6.0 to 8.0	Band D	Band C
8.0 to 12.0	4.0 to 6.0	Band C	Band D
12.0 to 16.0	6.0 to 8.0	Band D	Band D

d. Example. If the desired transmitting frequency is 5,263 kilocycles, proceed as follows:

(1) Insert the crystal marked 5,263 kc into the CRYSTAL receptacle.

(2) Use the above table to determine the proper coils:

(a) 5,263 kc lies between 4.0 and 6.0 mc.

(b) The 4.0 to 6.0 mc band requires BAND C coil for the oscillator and BAND B coil for the amplifier.

(3) Insert the BAND C coil in the OSC COIL receptacle.

(4) Insert the BAND B coil in the AMP COIL receptacle.

21. RECEIVER OPERATION.

a. Throw the BAND switch (SW3) to the desired position.

(1) Position 1 for frequencies between 4,500 and 8,000 kilocycles.

(2) Position 2 for frequencies between 8,000 and 16,000 kilocycles.

b. The frequency received is indicated on the dial, visible through the small window located above the d-c milliammeter. Rotate the RECEIVER TUNING knob to the desired receiving frequency.

c. Adjust the BFO OFF-ON switch (SW4) for the desired operation:

(1) Throw to ON when receiving c-w signals.

(2) Throw to OFF when receiving voice-modulated signals.

d. Turn the VOLUME control to the right (clockwise) to the maximum volume position. With the receiver in operation the volume level may be adjusted to suit the convenience of the operator.

e. Plug Headset HS-30 into the PHONES jack.

f. Throw the OFF-REC-SEND switch to the REC position.

g. Allow approximately 1 minute for the vacuum tube filaments to reach their proper operating temperature. The receiver now should be in operating condition, which will be evidenced by the presence of hiss and crackling sounds due to static and other forms of interference. If signals are not heard at the setting of the RECEIVER TUNING knob, try other settings until a signal is picked up. If it is impossible to pick up any signals or if the headset is dead, refer to paragraph 42.

22. TRANSMITTER OPERATION (fig. 2).

a. Plug telegraph Key J-47 into the KEY jack.

b. Throw the OFF-REC-SEND switch to the SEND position.

c. Tune the crystal oscillator as follows:

(1) Throw the OSC-AMP switch (SW5) to the OSC position.

(2) Press Key J-47 while rotating the OSC TUNING knob. Rotate the knob

until a pronounced dip is indicated by the d-c millimmeter. This dip in current indicates that the oscillator is operating.

(3) In order to insure rapid starting of the crystal oscillator while keying, rotate the knob slightly away from the minimum current position in the low-capacitance direction (towards 0 on the dial scale).

d. Tune the power amplifier as follows:

(1) Throw the OSC-AMP switch to the AMP position.

(2) Rotate the ANT COUPLING control knob to the maximum-capacitance position (knob pointer at 5 on the dial scale).

(3) Press Key J-47 while rotating the AMP TUNING knob. Rotate the knob until a pronounced dip is indicated by the d-c milliammeter. This dip in current indicates that the power-amplifier plate circuit is in resonance with the output frequency of the crystal oscillator or with the second harmonic of the crystal frequency.

(4) Set the AMP TUNING knob for a minimum current indication on the milliammeter.

NOTE: THE PLATE-TANK CIRCUIT OF THE CRYSTAL OSCILLATOR IS ALWAYS TUNED TO RESONANCE AT THE FREQUENCY OF THE CRYSTAL. THE PLATE-TANK CIRCUIT OF THE POWER AMPLIFIER MAY BE TUNED TO EITHER THE CRYSTAL FREQUENCY OR TO TWICE THE CRYSTAL FREQUENCY (SECOND HARMONIC), DEPENDING ON THE COIL IN USE IN THE POWER-AMPLIFIER STAGE.

e. Tune the antenna circuit as follows:

(1) Rotate the ANT COUPLING knob to the left (counterclockwise) until the milliammeter indication is approximately 80 milliamperes.

(2) Readjust the AMP TUNING control knob for a minimum indication on the

milliammeter.

(3) Then repeat steps (1) and (2) above until the minimum current indication on the milliammeter, while performing step (2), is 80 milliamperes.

CAUTION: DO NOT ALLOW THE HAND OR FINGERS TO FALL ACROSS BOTH SIDES OF KEY J-47. APPROXIMATELY 45 VOLTS ARE PRESENT. ALTHOUGH NOT PARTICULARLY HARMFUL THIS VOLTAGE CAN DELIVER A SERIOUS SHOCK UNDER CERTAIN CONDITIONS.

23. OPERATING PRECAUTIONS.

a. OFF-REC-SEND Switch.

(1) For transmitting, make sure that the switch is in the SEND position.

(2) For receiving, make sure that the switch is in the REC position.

b. OSC-AMP Switch.

(1) OSC position. This position is used only for tuning the oscillator.

(2) AMP position. The switch must be placed in this position for tuning operations on the power-amplifier and antenna circuits. It must be left in this position while transmitting.

c. ANT CURRENT Pilot Lamp. Assuming that the light filament is not open, the lamp should light every time the key is pressed, indicating that current is flowing in the antenna. If the lamp does not light under these conditions, the OSC TUNING knob has not been adjusted properly. Rotate the knob slightly toward the left (counterclockwise) until the lamp flashes every time the key is pressed (par. 22c(3)).

NOTE: THE BRIGHTNESS OF THIS LAMP WILL NOT BE THE SAME UNDER ALL CONDITIONS OF NORMAL OPERATION. THE BRIGHTNESS OF THE LAMP IS DEPENDENT ON THE POSITION OF MAXIMUM CURRENT ON THE ANTENNA

AND WILL VARY CONSIDERABLY WITH THE FREQUENCY AND THE LENGTH OF THE ANTENNA IN USE. IN ANY CASE, TUNE THE OUTPUT CIRCUITS FOR MAXIMUM BRILLIANCE OF THE LAMP WITHOUT REGARD TO THE RELATIVE BRILLIANCE OBTAINED AT ANOTHER FREQUENCY OR WITH ANOTHER ANTENNA INSTALLATION.

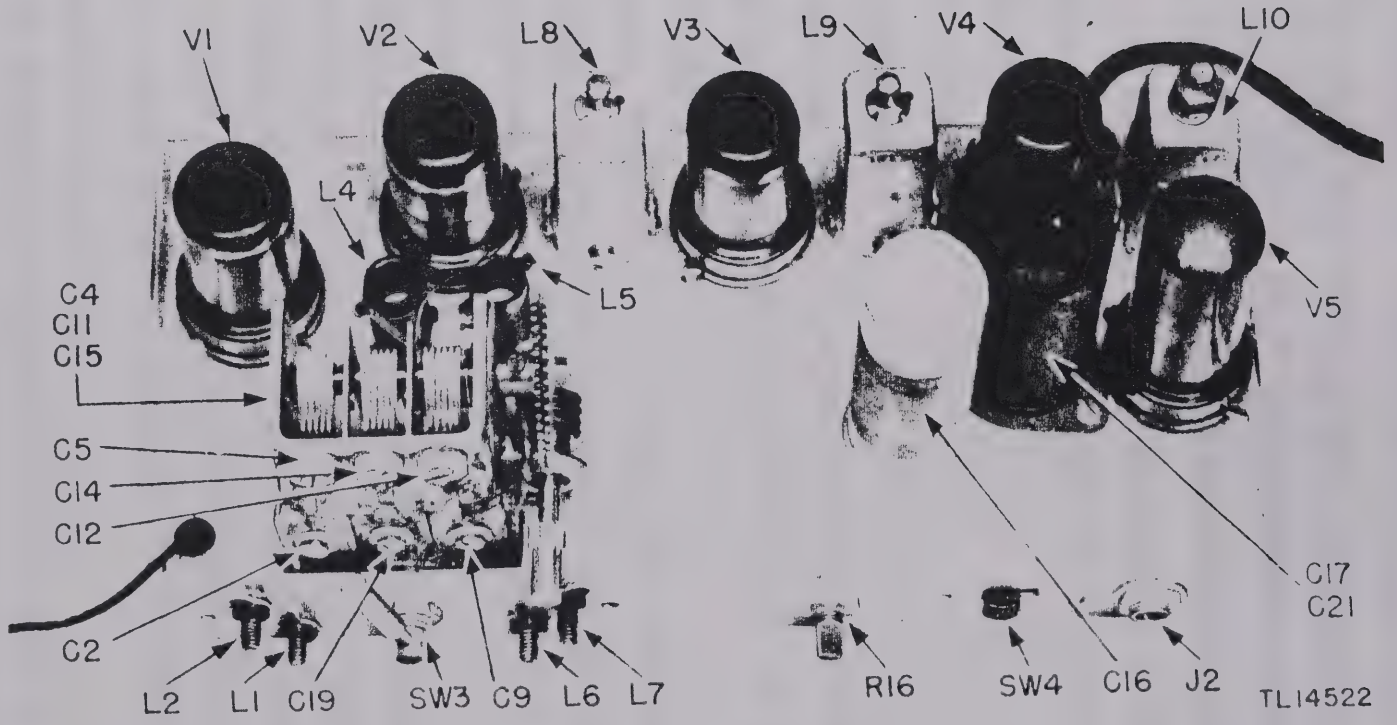

Figure 3. Radio Set AN/PRC-5, receiver chassis.

SECTION III

FUNCTIONING OF PARTS

24. GENERAL. The schematic diagram of Radio Set AN/PRC-5 is shown on figure 15. The symbol numbers used in the following circuit descriptions are the same as those appearing on this diagram.

25. RECEIVER FUNCTIONING (fig. 3). In the REC position of the OFF-REC-SEND switch, the set acts as a five-tube superheterodyne receiver, exclusive of the power supply which is common to both the receiver and transmitter, consisting of one r-f amplifier stage, using a 6SK7 tube; one converter stage, using a 6SA7 tube; one i-f amplifier stage, using another 6SK7 tube; one combined diode detector and beat-frequency oscillator stage, using a 6SR7 tube; and two stages of a-f amplification using both portions of a twin-triode 6N7 tube.

26. RADIO-FREQUENCY AMPLIFIER. The signal input to the receiver through the binding post marked ANT is connected through OFF-REC-SEND switch SW1 to the primary windings of antenna input transformers L1 and L2 which are connected in series to ground. The r-f signal voltages present in these primary windings are inductively coupled into the secondary windings of L1 and L2 for bands 2 and 1, respectively. The secondary winding of L1 together with section C4 of the 3-gang variable tuning capacitor, fixed capacitor C1, and trimmer capacitor C5 constitute the first tuned circuit for band 2. The secondary winding of L2 together with section C4 of the variable tuning capacitor and trimmer capacitors C2 and C5 constitute the first tuned circuit for

band 1. The signal voltage developed across the tuned circuit in use is coupled to the grid of a 6SK7 tube V1 by blocking capacitor C3. Avc bias voltage is fed to the grid of tube V1 through grid-return resistor R1. The secondary windings of transformers L1 and L2 are provided with adjustable iron cores for inductance trimming. These trimmer elements in conjunction with trimmer capacitors C2 and C5 permit accurate alignment of the tuned circuits with the succeeding tuned circuits at both ends of the frequency bands. Either transformer L2 for band 1 or transformer L1 for band 2 is placed in operation by section A of the BAND switch SW3. Note that the action of this switch is to short circuit the transformer winding not in use. Plate voltage from the high-voltage d-c supply line is applied to the plate of tube V1 through r-f choke coil L3, the lower end of which is bypassed to ground by capacitor C7. Screen grid voltage is obtained from the high-voltage supply line through a decoupling and voltage divider network consisting of resistors R2 and R3 in series with the screen grid connected to the junction of the two resistors. C6 is the screen-grid bypass capacitor to ground. The suppressor grid, cathode, one side of the heater, and the tube shell are all connected to ground.

27. CONVERTER. The amplified signal voltage from the plate of r-f amplifier tube V1 is coupled to the r-f tuned circuits using coils L4 and L5 by blocking capacitor C8. Coil L4 together with section C11 of the 3-gang variable tuning capacitor and trimmer capacitor C12 constitute the second tuned circuit for band 2. Coil L5 together with section C11 of the variable tuning capacitor and trimmer capacitors C9 and C12 constitute the second tuned circuit for band 1. The signal voltage developed across the tuned circuit in use is coupled to the signal grid of the 6SA7 converter

tube V2 by blocking capacitor C10. Avc bias voltage is fed to this same grid through grid-return resistor R4. Adjustable iron cores in coils L4 and L5 permit inductance trimming which together with trimmer capacitors C9 and C12 permits accurate alignment of these circuits with the other circuits in the receiver at both ends of the frequency bands. Either coil L5 for band 1 or coil L4 for band 2 is placed in operation by section B of the BAND switch SW3. The action of the switch is to short circuit the coil not in use. Plate voltage from the high-voltage d-c supply line is applied to the plate of tube V2 through the primary winding of intermediate frequency transformer L8, the lower end of which is bypassed to ground by capacitor C28. R5 is the screen-grid voltage-dropping and decoupling resistor and capacitor C13 bypasses the screen grid to ground. The suppressor grid, one side of the heater, and the tube shell are also connected to ground.

28. HIGH-FREQUENCY OSCILLATOR CIRCUIT. The high-frequency oscillator circuit uses the remaining elements of converter tube V2 connected in a separate and independent oscillator circuit. By this means the functions of a mixer and an oscillator are combined in the one tube V2. The signal frequency coupled into the signal grid of tube V2 and the oscillator output frequency of the oscillator circuit combine in the tube because of electron coupling to produce the intermediate frequency which is the difference between the other two frequencies. The secondary winding of oscillator transformer L6 together with section C15 of the 3-gang tuning capacitor, fixed capacitor C18, and trimmer capacitor C14 constitute the oscillator tuned circuit for band 2. The secondary winding of oscillator transformer L7 together with section C15 of the variable tuning capacitor and trimmer

capacitors C14 and C19 constitute the oscillator tuned circuit for band 1. Trimmer capacitors C14 and C19 permit capacitance trimming at the high-frequency end of both bands. An adjustable iron core in each transformer secondary winding permits variable inductance trimming for accurate alignment of the tuned circuits at the low-frequency end of each band. Fixed capacitors C20 and C37 (tracking capacitors) are used to modify the tuning of the high-frequency oscillator circuit so that it will maintain a fixed frequency difference of 455 kilocycles with respect to the signal frequency when the 3-gang tuning capacitor is varied from minimum to maximum capacitance on each band. Oscillation is caused and maintained by the feedback created by the primary windings of transformers L6 and L7. These primary coils are connected between the cathode of tube V2 and ground, and are closely coupled to the secondary windings of their respective transformers. The secondary windings are coupled to the oscillator grid of tube V2 by blocking capacitor C51. R6 is the oscillator grid-leak resistor, and develops the necessary operating grid-bias voltage by virtue of the rectified grid current flowing through it. Both the primary and secondary windings of the transformers not in use are short-circuited by sections D and C, respectively, of BAND switch SW3.

29. I-F AMPLIFIER. The signal frequency arriving at the signal grid of converter tube V2 and the high-frequency oscillator frequency developed in this same tube are mixed (or heterodyned) and the resultant difference (455 kilocycles) is fed to the input of the i-f amplifier. Transfer of i-f energy from the plate of converter tube V2 to the diode detector tube V4 is accomplished by inductive coupling through i-f transformers L8 and L9 and

amplification supplied by tube V3. I-f transformers L8 and L9 consist of two tuned circuits, primary and secondary, both of which are tuned to the i-f of 455 kilocycles by means of fixed padder capacitors and adjustable iron cores. The adjustment screws for the iron cores are accessible at the top and bottom of the transformer shield can. The high potential ends of the primary windings of both transformers connect to the plates of tubes V2 and V3, respectively. The low potential ends of both primary windings are connected to the high-voltage d-c supply line which is bypassed to ground by capacitor C28. The high-potential end of the secondary winding of transformer L8 is connected to the control grid of the 6SK7 tube V3 while the low-potential end of this same winding is connected to the avc voltage supply line, and is bypassed to ground by capacitor C26. R7 is the screen-grid voltage-dropping and decoupling resistor, and capacitor C23 bypasses the screen grid to ground. The suppressor grid, cathode, one side of the heater, and the tube shell are all connected to ground. The high-potential end of the secondary winding of transformer L9 is connected to one of the diodes in tube V4, while the low-potential end of this same winding is connected to diode load resistor R8.

30. DIODE DETECTOR. The 6SR7 tube V4 is a duo-diode-triode type. One of the diode plates is grounded while the other is connected to the high-potential end of i-f transformer L9 to detect the incoming i-f signals. Since the cathode is grounded the tube acts as a half-wave rectifier. The voltage developed across the diode-load resistors R8 and R16 is filtered by resistor R17 and capacitor C26, and the resulting direct-current avc voltage is used to control the gain of tubes V1, V2, and V3, the degree of this control being dependent upon the strength of the incoming signal. Resistor R8

together with capacitors C24 and C25 comprise a filter which prevents the i-f voltages present in the diode circuit from getting into the avc and audio-frequency circuits.

31. A-F AMPLIFIER STAGES. A dual-triode type 6N7 tube V5 is used for both stages of a-f amplification. The a-f voltage developed across diode-load resistor R16 (the receiver VOLUME control), as a result of the rectifying action of the diode circuit, is coupled to the control grid of one section of tube V5 by blocking capacitor C27. R14 is the grid-return resistor and R13 is the cathode-biasing resistor for both sections of the tube. This biasing resistor is bypassed for a-f voltages by capacitor C30. The a-f voltage developed across plate-load resistor R15 of the first section of tube V5 is coupled to the grid of the second section of the tube by blocking capacitor C31. The plate of the first section is also bypassed to ground for r-f and i-f currents by capacitor C29. R12 is the grid-return resistor of the second section. The a-f voltage developed across plate-load resistor R11 of the second section is coupled to the PHONES jack through blocking capacitor C34. The PHONES jack is bypassed for r-f and i-f currents by capacitor C35.

32. BEAT-FREQUENCY OSCILLATOR. The triode section of tube V4 is used in conjunction with transformer L10 to form an oscillator circuit operating near the intermediate frequency of 455 kc. The oscillator signal so produced is heterodyned with the i-f signal frequency because of capacitance coupling within the tube between the detector diode and the elements of the oscillator portion of the tube to produce a beat note for the reception of c-w signals. The oscillator circuit is of the tuned-grid, untuned-plate type. The plate winding of the transformer is shunted by a fixed capacitance.

The inductance of the grid winding is varied over a limited range by an adjustable iron core. The oscillator circuit is usually tuned to operate at about 1 kilocycle (1,000 cycles) difference from the intermediate frequency. The plate of tube V4 is connected to the high-voltage d-c supply line through the primary winding of L10, decoupling and voltage-dropping resistor R10, and the BFO OFF-ON switch SW4. The lower end of the primary winding is bypassed to ground by capacitor C33. The grid of tube V4 is coupled to the secondary winding of transformer L10 by capacitor C32, and R9 is the oscillator grid-leak resistor.

33. POWER SUPPLY. The proper a-c voltage for operation of all the vacuum-tube heaters in both the receiver and transmitter sections is obtained from a common secondary winding on power transformer TR. One side of this secondary is connected to ground. The cathode of the 5Z4 rectifier tube V8 is heated by another secondary winding of the proper potential. A third secondary winding supplies high-voltage alternating current to the plates of rectifier tube V8. The center tap of this high-voltage secondary winding is grounded. The rectified pulsating d-c voltage is taken from the cathode of tube V8 and is filtered (smoothed) by the capacitor-input filter composed of capacitors C16, C17, and C21, and the choke coil L16. The input capacitors C17 and C21 are connected in series so that the total voltage appearing across each will be smaller. Resistors R20 and R34 connected across these capacitors equalize the voltages appearing across them. C16 is the output capacitor. R19 is a bleeder-resistor across the filter. The filtered high-voltage d-c output of the power supply is always applied to the receiver section of the transceiver through series-dropping resistor R18 when the equipment is in use, and is applied to the trans-

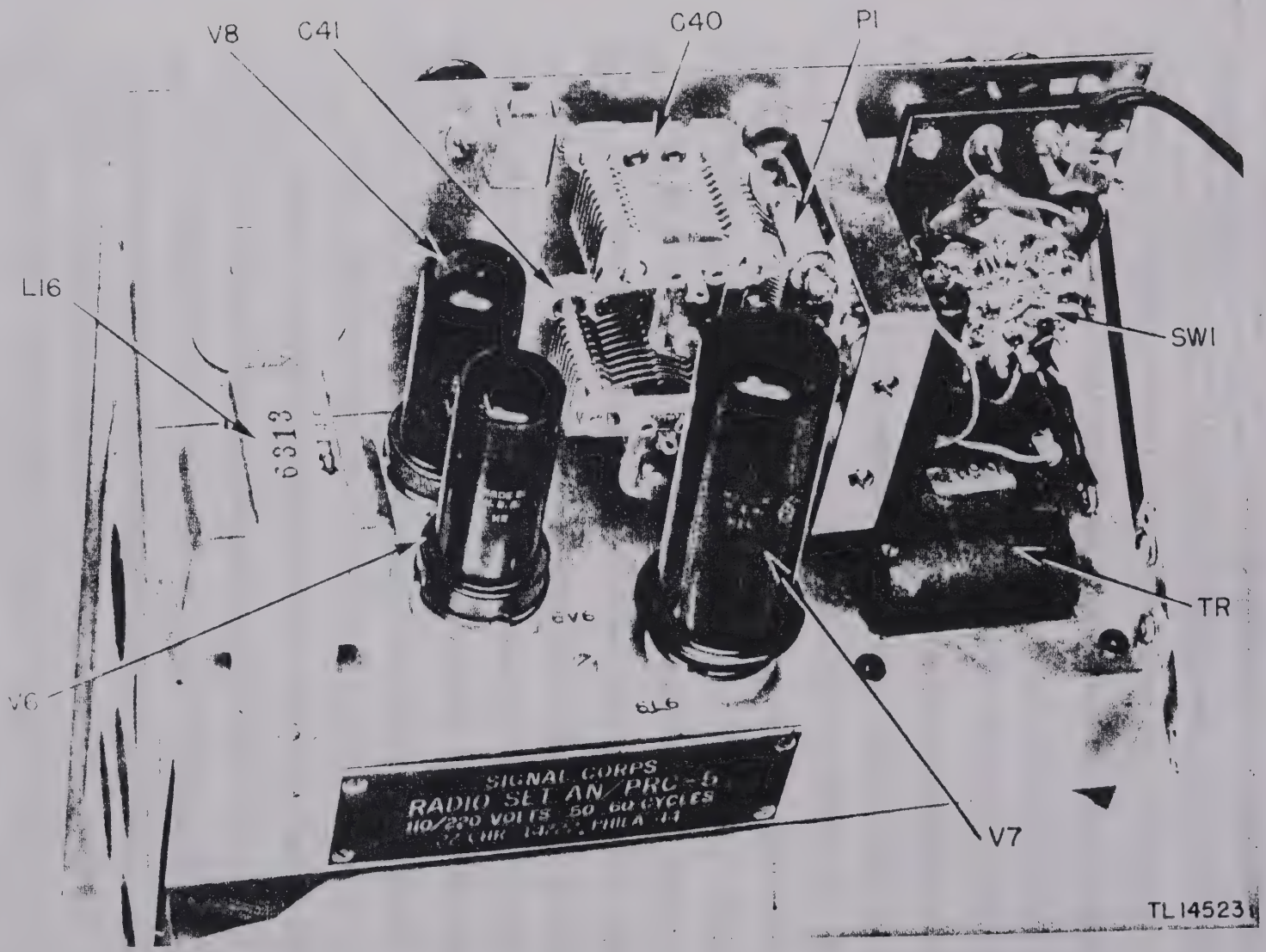

Figure 4. Radio Set AN/PRC-5, transmitter and power-supply chassis.

mitter section through OFF-REC-SEND switch SW1 only when this switch is in the SEND position. Transformer TR has two separate 110-volt primary windings. By means of the 110-220 toggle switch SW2, these primary windings are connected in parallel for operation on a 110-volt power source, and the windings are connected in series for operation on a 220-volt power source. These primary windings are disconnected from the power line by the OFF-REC-SEND switch SW1 when it is in the OFF position. A power line fuse F, in the primary circuit, provides protection from momentary overloads and short circuits. The green pilot lamp P2 is connected across the secondary winding supplying the vacuum-tube heaters to indicate when the power is on.

34. TRANSMITTER FUNCTIONING (fig. 4). In the SEND position of the OFF-REC-SEND switch, the set acts as a two-stage crystal-oscillator power-amplifier (MOPA) transmitter, exclusive of the power supply which is common to both the receiver and the transmitter. It consists of a 6V6 tube V6 in the crystal-oscillator stage, and a 6L6 tube V7 in the power-amplifier stage.

35. CRYSTAL OSCILLATOR. The oscillator circuit uses a 6V6 tube V6 in a conventional crystal-controlled tetrode-type arrangement. The quartz crystal X, ground to the operating frequency (or to one-half the output frequency), is used for increased frequency stability. Variable tuning capacitor C47 and plug-in coil L12 form a plate tank circuit which is tuned to resonance with the crystal frequency. Voltage is applied to the plate of tube V6 from the high-voltage d-c supply line through r-f choke coil L11 and voltage-dropping resistor R33. The lower end of this choke coil is bypassed to the cathode by capacitor C36. Capacitor C48 couples the plate of tube V6 to the plate tank circuit and isolates the tank circuit from the high d-c voltage so that the low-potential end of the tank circuit may be ground-

ed. This is also a safety feature in that the operator will not receive a high-voltage shock if he should touch the tank coil with the power on. The screen-grid voltage is supplied by the voltage divider network composed of resistors R28 and R29. The screen grid is bypassed to the cathode by capacitor C49. An initial bias voltage is developed across cathode-bias resistor R30, bypassed by capacitor C50, in the cathode circuit of tube V6. Additional operating bias voltage is developed in grid-leak resistor R32 by the flow of rectified grid current through it. The cathode current of tube V6 is indicated by d-c milliammeter M when it is connected in series with the cathode circuit by OSC-AMP switch SW5 in the OSC position, and the circuit is completed to ground by pressing Key J-47. The cathode circuit returns to ground through resistors R31 and R23 when the OSC-AMP switch is in the AMP position. Resistor R23, shunted around KEY jack J1, developes additional cathode bias when the key is up so that operation of the oscillator and amplifier tubes will be completely blocked.

36. POWER AMPLIFIER. The r-f voltage developed across the oscillator plate tank circuit composed of capacitor C47 and coil L12 is coupled to the grid of the 6L6 power amplifier tube V7 by blocking capacitor C45. This voltage is amplified by beam-power amplifier tube V7, the output of which is developed across the amplifier plate tank circuit consisting of plug-in coil L14 and variable tuning capacitors C40 and C41. When the proper plug-in coil L14 is used, the tank circuit may be tuned to resonance with the output frequency of the oscillator circuit (crystal frequency operation) or it may be tuned to resonance at twice the fundamental frequency of the crystal for operation on the second harmonic of the output frequency of the crystal oscillator.

Refer to paragraph 20c for selection of proper coils. Thus two output frequencies are obtainable from the power amplifier circuit for each quartz crystal used. Voltage is applied to the plate of tube V7 from the high-voltage d-c supply line through r-f choke coil L13. The lower end of this choke coil is bypassed to ground by capacitor C43. Blocking capacitor C39 couples the plate of tube V7 to the plate tank circuit and isolates the tank circuit from the high d-c voltage so that the antenna wire and the tank coil L14 will be free of this voltage.

CAUTION: IF THE ANTENNA WIRE OR TANK COIL IS TOUCHED DURING OPERATION A SEVERE R-F BURN MAY RESULT IN SPITE OF THE FACT THAT THE HIGH-VOLTAGE DIRECT CURRENT IS NOT PRESENT.

The screen-grid voltage is supplied by the voltage divider network composed of resistors R21 and R22. The screen grid is bypassed to ground by capacitor C42. An initial bias voltage is developed across cathode-bias resistor R24, bypassed by capacitor C44, in the cathode circuit of tube V7. Additional operating bias voltage is developed in grid-leak resistors R26 and R27 by the flow of rectified grid current through them. Resistor R27 is bypassed for r-f current and voltage by capacitor C46. The cathode current of tube V7 is indicated by d-c milliammeter M when it is connected in series with the cathode circuit by OSC-AMP switch SW5 in the AMP position, and the circuit is completed to ground by pressing Key J-47. When the OSC-AMP switch is placed in the OSC position, resistor R25 is connected in series with cathode-bias resistor R24 for the purpose of applying a high bias to tube V7 while the oscillator circuit is being tuned. This prevents the plate current of tube V7 from rising to high values while oscillator tuning adjustments are being made.

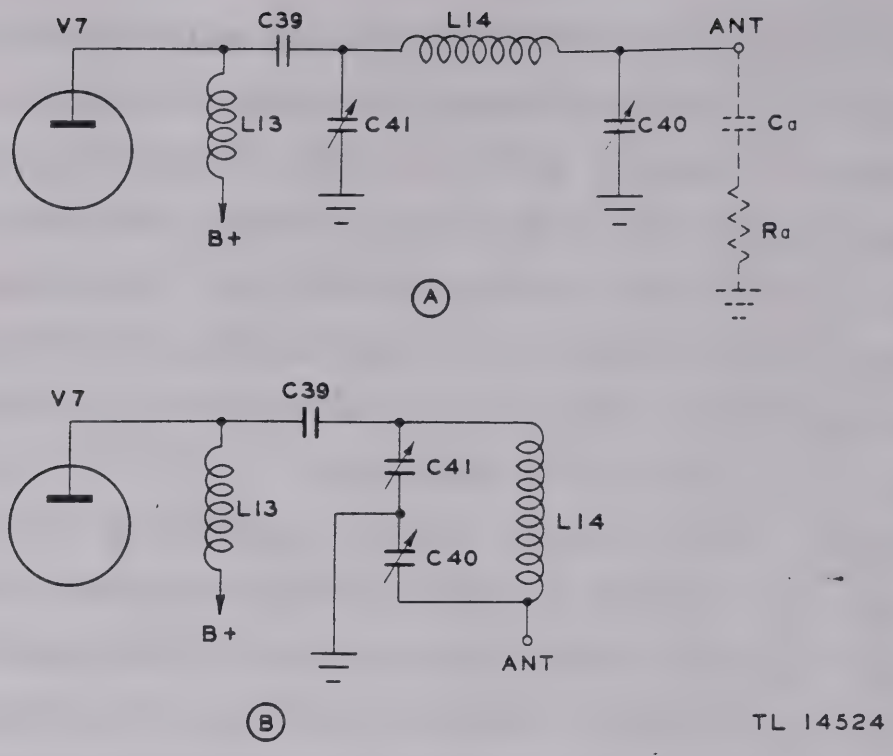

Figure 5. Radio Set AN/PRC-5, functional diagram of plate-tank and antenna circuits.

37. ANTENNA CIRCUIT. The plate output circuit is unusual because the dual function of the plate-tank and antenna-tuning circuits are combined into one simple circuit (fig. 5a). If ANT COUPLING capacitor C40 and Ca (antenna capacitance to ground) are combined into one variable capacitance C40, and the antenna resistance Ra is neglected, the circuit in figure 5a reduces to figure 5b. This can be done because the resistance Ra is very low as compared to the reactance of capacitor C40. This is recognizable as a parallel resonant circuit whose capacitive branch is made up of AMP TUNING capacitor C41 in series with ANT COUPLING capacitor C40, and whose inductive branch is coil L14. When properly tuned, this resonant circuit must satisfy the two following conditions:

a. Capacitors C41 and C40 in series must resonate L14 to the operating frequency.

b. The ratio C41: C40 must be of such value that the power-amplifier tube V7 works into the correct load impedance as viewed from the antenna. Therefore, for each setting of capacitor C40 there is also a setting of capacitor C41 which produces resonance (as indicated by a minimum value of the power-amplifier plate current). Only one value of C40 and C41 will satisfy both of the above conditions. For the proper method of tuning this circuit, refer to paragraphs 22d and e. It is possible to provide suitable loading of an antenna of given length throughout the entire frequency range of the transmitter. The antenna is connected to the transmitter portion of the transceiver, and likewise plate voltage is applied to the transmitter, only when the OFF-REC-SEND switch SW1 is in the SEND position. Antenna current is indicated by ANT CURRENT lamp P1. Coil L15 connected across this indicator lamp prevents loss of operation in case of lamp filament failure, and the size of the coil is such as to provide sufficient r-f voltage to light the lamp under normal antenna current output. The brightness of this lamp will not be the same under all conditions of normal operation. The brightness of illumination produced depends on the position of maximum current on the antenna and will vary considerably with the frequency and the length of the antenna in use. In any case, the antenna circuit is tuned for maximum brilliance of the lamp without regard to the relative brilliance obtained at another frequency or with a different antenna installation.

SECTION IV

MAINTENANCE

NOTE: Unsatisfactory performance of this equipment will be reported immediately on W.D., A.G.O. Form No. 468. If Form No. 468 is not available, see TM 38-250.

38. GENERAL. Adjustments, repairs, or disassembly of the equipment should not be attempted by personnel not trained to service this type of equipment. Trained personnel and suitable equipment must be available before the equipment can be tested for major faults. Adequate test equipment for the maintenance and repair of Radio Set AN/PRC-5 should include the following items:

a. An r-f standard signal generator.

b. An a-f output meter.

c. A universal analyzer capable of indicating all a-c and d-c voltages, necessary direct-current values, and the resistance value of all resistors.

d. A 400-ohm dummy antenna, transmitting type.

e. An r-f milliammeter, range 0 to 500 milliamperes.

39. OPERATIONAL INSPECTION.

a. Check the mounting of all components. Inspect all nuts, bolts, and screws for tightness. Inspect all soldered joints and wiring. Remove all traces of corrosion. Clean the equipment thoroughly and touch up scratched paint.

b. Inspect all plugs and knobs. Make sure that plugs are clean and that knobs are tight. Check headset and key cords. Check the power cord, the power-cord plug, and the adapter plugs furnished with the equipment.

c. Check the antenna wire for breaks and frayed points, and check the connection of the antenna wire at the ANT post.

d. Make sure that all tubes, plug-in coils, and the crystal are properly seated in their respective sockets.

e. Operate the equipment as a receiver. Tune in different stations in each band. Select stations providing weak signals and check the receiver sensitivity. Check the noise level in the receiver and turn on the beat-frequency oscillator and check for the beat note against incoming signals.

f. Operate the equipment as a transmitter. Make the proper tuning adjustments while using various crystals and plug-in coils. Make sure that the ANT CURRENT indicator lamp lights when the key is pressed.

g. Check the bulb of the green pilot-light lamp P2.

40. REPLACEMENT OF TUBES, FUSES, AND INDICATOR LAMPS.

a. Failure of a vacuum tube in the receiver may reduce the sensitivity of the receiver to received signals, may produce intermittent operation, may cause noise or hum, or may cause the receiver to be completely inoperative. In such cases, make substitutions for the tubes in use from the tubes supplied with the equipment as operating spares until the defective tube is located.

b. Failure of a vacuum tube in the transmitter may cause reduced power output, improper reading of the d-c milliammeter M, or complete inoperation of the transmitter. In such cases, make substitutions for the tubes in use from the tubes furnished as operating spares.

c. Failure of the rectifier tube in the power supply will cause poor operation or complete inoperation of both the receiver and the transmitter. In such a case, make a substitution from the operating spares furnished with the equipment.

d. The primary fuse F will blow when the primary circuit of transformer TR is overloaded either because of some defective tube or part in the equipment, momentary overloads, or because of the use of an improper line voltage or frequency. To replace the fuse, remove the small red insert marked FUSE, at the upper left-hand portion of the front panel, with a small screwdriver. Replace it with a new fuse supplied with the equipment as an operating spare. Replace the insert.

e. To replace the green pilot lamp, at the center left-hand side of the front panel, remove the six screws holding the chassis-supporting side plate. Push in on the lamp and turn it to the left. The lamp will now lift out easily. Replace it with a lamp of the same voltage and current rating, furnished with the equipment as an operating spare. To replace the lamp, guide protrusions on the side of the lamp base into slots in the socket, press in, and turn the lamp to the right. Replace the side plate and the six screws.

f. To replace the ANT CURRENT indicator lamp, at the center top-side of the front panel, press the lamp down into its socket and turn it slightly to the left. The lamp will now lift out easily. Replace it with a lamp of the same voltage and current rating, furnished with the equipment as an operating spare. To replace the lamp, guide protrusions on the side of the lamp base into slots in the socket, press in, and turn the lamp to the right.

41. RECEIVER ALIGNMENT. Should realignment of the receiver section of Radio Set AN/PRC-5 become necessary, the following alignment procedure should be followed.

a. General. All adjustments should be made with an output meter connected to the PHONES jack J2 with a 10,000-ohm load resistor connected across the term-

inals of the plug inserted in the jack. Make all adjustments with the BFO switch (SW4) in the OFF position and with the VOLUME control knob set for maximum volume (extreme clockwise position).

b. I-f Alignment. The intermediate frequency of the receiver is 455 kilocycles. Tuning adjustments are provided for both the primary and secondary windings of i-f transformers L8 and L9. One adjustment is made on top of each transformer while the other adjustment is made on the bottom of each. The adjusting devices consist of hexagonal-head screws which slide iron cores in and out of the coil windings. Set the standard signal generator for an output of 455 kilocycles and connect its high-potential output lead to the signal grid (terminal No. 8) of converter tube V2. Connect the low-potential output lead from the signal generator to any metal part making direct connection to the chassis. Adjust the output voltage of the signal generator for an indication of approximately 10 volts on the output meter. Adjust the i-f trimmer adjustment screws for a maximum output indication on the output meter. Readjust the output of the signal generator from time to time while making these adjustments in order to keep the output meter indication at or near 10 volts.

c. Beat-frequency Oscillator Alignment. The beat-frequency oscillator should not require adjustment except when the set has been subjected to extremely rough handling or possibly after tube V4 has been changed. The following procedure must be followed in case it is found necessary to align the beat-frequency oscillator. With the standard signal generator set for an output of 455 kilocycles, connect it to the radio set as described in subparagraph b above. Remove the plug connected to the output meter from the PHONES jack and insert the headset plug into the PHONES jack. Adjust the trimmer screw

on top of transformer L10 until the most pleasing beat note is obtained. (This adjustment is not critical. A beat-note frequency of about 1,000 cycles is found to be satisfactory in most cases.)

d. High-frequency Oscillator Alignment. Realignment of the high-frequency oscillator circuits for either frequency band is seldom necessary unless the resonant frequency of the receiver, as indicated by the reading of the tuning dial, is greatly in error with respect to the actual frequency being received. The following procedure must be followed in adjusting the high-frequency oscillator trimmers. All adjustments are made with the output of the signal generator connected to the ANT and GND posts, in the upper-right-hand corner of the front panel, and with the output meter connected as described in subparagraph a above. Always make the adjustments on band 2 first, since trimmer capacitors C5, C12, and C14 are common to both bands and their adjustment will, therefore, also affect the alignment of band 1. For location of the oscillator trimmer adjusting screws refer to figures 3 and 6.

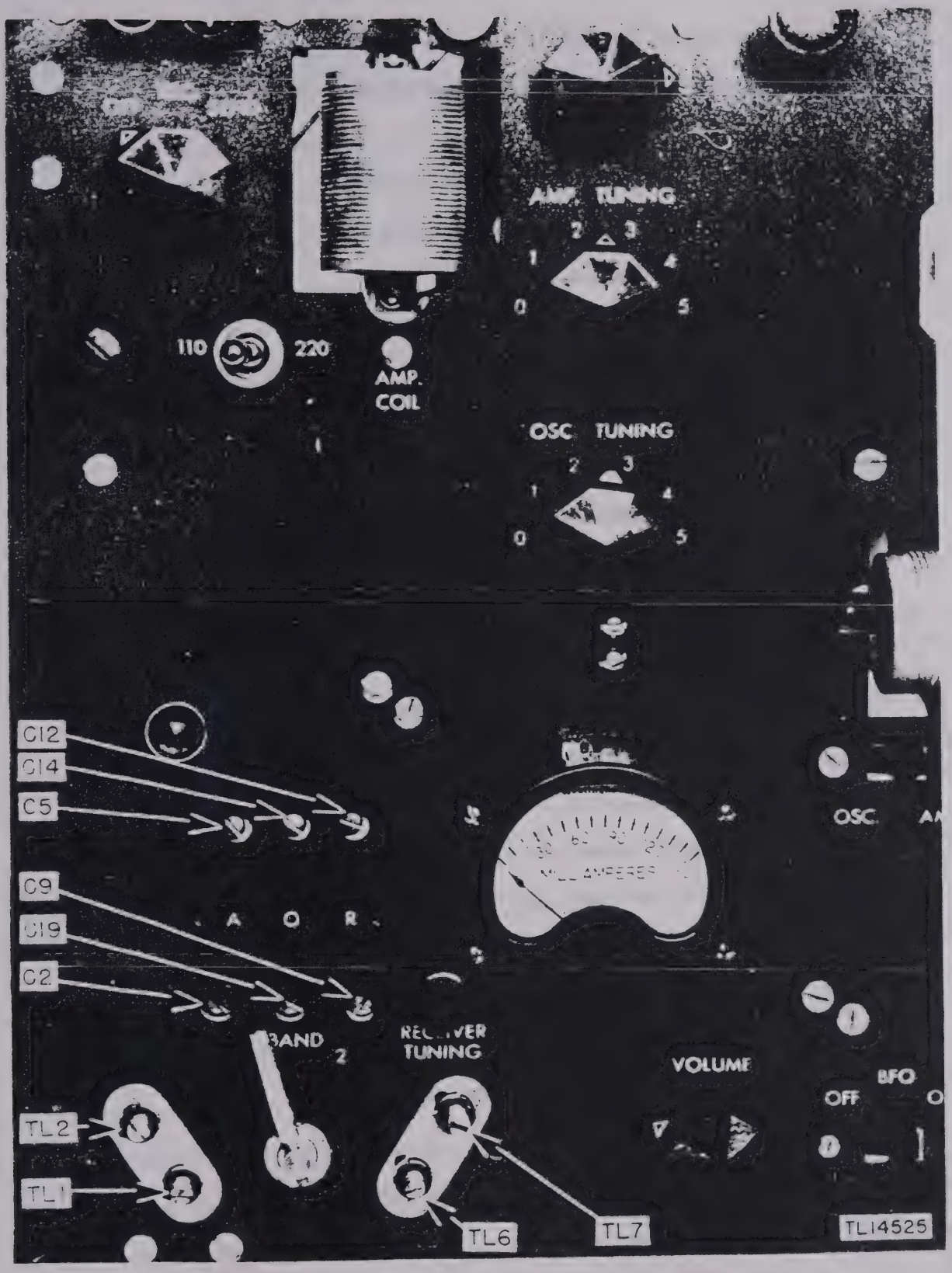

Figure 6. Radio Set AN/PRC-5, location of trimmer adjustments.

(1) ALIGNMENT PROCEDURE FOR BAND 2.

(a) Place the receiver BAND switch in position 2, and set the receiver dial to 16.0 mc.

(b) Set the signal generator for output at 16.0 mc.

(c) Adjust trimmer capacitor C14 for maximum output.

(d) Set receiver dial to 8.2 mc.

(e) Set the signal generator for output at 8.2 mc.

(f) Adjust iron core trimmer in transformer L6 for maximum output.

(g) Repeat steps (a) through (f) above, inclusive, until the dial markings correspond to these two frequencies without further adjustment.

(2) ALIGNMENT PROCEDURE FOR BAND 1.

(a) Place the receiver BAND switch in position 1, and set the receiver dial to 8.0 mc.

(b) Set the signal generator for output at 8.0 mc.

(c) Adjust trimmer capacitor C19 for maximum output.

(d) Set receiver dial to 4.5 mc.

(e) Set the signal generator for output at 4.5 mc.

(f) Adjust iron core trimmer in transformer L7 for maximum output.

(g) Repeat steps (a) through (b) above, inclusive, until the dial markings correspond to these two frequencies without further adjustment.

e. R-f Amplifier Alignment. With the signal generator connected to the ANT and GND posts, and with the output meter connected as above, align the r-f stage in accordance with the following procedure:

(1) ALIGNMENT PROCEDURE FOR BAND 2.

(a) Place the receiver BAND switch in position 2, and set the receiver dial to 16.0 mc.

(b) Set the signal generator for output at 16.0 mc.

(c) Adjust trimmer capacitors C5 and C12 for maximum output.

(d) Set receiver dial to 8.2 mc.

(e) Set the signal generator for output at 8.2 mc.

(f) Adjust the iron core trimmers in coils L1 and L4 for maximum output.

(g) Repeat steps (a) through (f) above, inclusive, until maximum output is obtained at both dial settings.

(2) ALIGNMENT PROCEDURE FOR BAND 1.

(a) Place the receiver BAND switch in position 1, and set the receiver dial to 8.0 mc.

(b) Set the signal generator for output at 8.0 mc.

(c) Adjust trimmer capacitors C2 and C9 for maximum output.

(d) Set receiver dial to 4.5 mc.

(e) Set the signal generator for output at 4.5 mc.

(f) Adjust the iron core trimmers in coils L2 and L5 for maximum output.

(g) Repeat steps (a) through (f) above, inclusive, until maximum output is obtained at both dial settings.

f. Precautions During Alignment. It is essential that the input signal from the signal generator be kept below the threshold of operation of the avc circuit. Maintain an output meter indication of 10 volts or less. Excessive signal inputs will cause overload of either the diode detector or audio-amplifier circuits, and must be avoided because of incorrect alignment indications.

42. PROCEDURE IN LOCATING TROUBLE.

a. Speed in locating trouble in equipment is essential. Frequently after much time has been wasted searching for the cause of equipment failure, the

trouble is found to be so minor that only a few minutes are required to correct it. Follow a systematic process in eliminating possible causes of trouble when failure does occur. It is useless to remove the shields from the transceiver unit and to institue a thorough-going continuity check of the circuits when the symptom of trouble is a lack of voltage or current indication. The common-sense thing to do first is to check the cords, plugs, jacks, switches, and fuses in the unit. They often are sources of trouble. If they are not at fault, the simple act of checking, which takes a few minutes, eliminates them as a possible cause of the trouble. Always check the obvious and simple things first. Make sure that the power cord is actually connected to the power source, and make sure that all plugs are making good contact in their sockets or jacks. When this has been done, and not before, it is time to undertake a close examination of the complete transceiver unit. Daily inspection of the equipment will serve to minimize failures due to minor faults, such as breaks in connecting cords and poor contacts.

b. The trouble chart below lists a number of typical troubles which may occur in this equipment. Note that some of these are caused by failure to adjust the equipment properly when setting it up for use. Always re-check the installation and tune-up procedure before operating the equipment.

TROUBLE CHART

Trouble	Probable causes	Remedy
Receiver dead.	Power switch OFF.	Turn OFF-REC-SEND switch to REC position.
	Headset plug not inserted in PHONES jack.	Insert headset plug in PHONES jack.
	Defective Headset HS-30.	Replace headset.
	Antenna lead disconnected, loose, or shorted.	Check antenna connection.
	Antenna wire touching metallic material or wet foliage.	Check antenna installation and keep clear of objects. See paragraph 18.
	Defective or burned-out tube or tubes.	Replace tubes.
	Fuse burned out.	Replace fuse.
	VOLUME control turned off.	Turn VOLUME control to the right (clockwise).
	One or more tubes not seated properly in socket.	Push tubes firmly into their sockets.
Receiver weak.	VOLUME control set too low.	Turn VOLUME control to the right.
	Antenna lead disconnected, loose, or shorted.	Check antenna connection.
	Antenna wire touching metallic material or wet foliage.	Check antenna installation and keep clear of objects. See paragraph 18.
	Defective or burned-out tube or tubes.	Replace tubes.
	Power switch in SEND position.	Turn OFF-REC-SEND switch to REC position.
	Defective Headset HS-30.	Replace headset.
	Receiver out of alignment.	Align receiver. See paragraph 41.
	Excessive moisture in carrying case as a result of exposure.	Allow equipment to dry out in a well-ventilated place.

Trouble	Probable causes	Remedy
	Line voltage 110-220 switch in 110 position on 220-volt power line.	If power source in use is 220 volts, place switch in 220 position. See paragraphs 5 and 7a.
Transmitter dead.	Power switch in OFF or REC position.	Turn OFF-REC-SEND switch to SEND position.
	Key plug not inserted in KEY jack.	Insert key plug into KEY jack. See paragraphs 10 and 7b(2)(i).
	Fuse burned out.	Replace fuse.
	Defective or burned-out tube or tubes.	Replace tubes.
	One or more tubes not seated properly in socket.	Push tubes firmly into their sockets.
	Defective key or key plug and cord.	Replace.
	Defective crystal unit.	Replace.
	Incorrect transmitting coil in use.	Check with paragraph 20c.
	Broken antenna wire.	Replace.
	Antenna lead disconnected, loose, or broken.	Check antenna connection.
	Improper tuning of oscillator, amplifier, or antenna controls.	Check tuning with paragraph 22.
Transmitter weak.	Antenna wire touching metallic object or wet foliage.	Check antenna installation and keep clear of objects. See paragraph 18.
	Line voltage 110-220 switch in 110 position on 220-volt power line.	If power source in use is 220 volts, place switch in 220 position. See paragraphs 5 and 7a.
	Improper setting of ANT COUPLING control.	Readjust in accordance with paragraphs 22d and e.
	Defective tube or tubes.	Replace tubes.

43. VOLTAGE MEASUREMENTS. The following tube-socket layout diagrams show voltages obtained from each tube-socket pin to chassis, under the specified conditions, for the receiver, transmitter, and power supply portions of the transceiver unit.

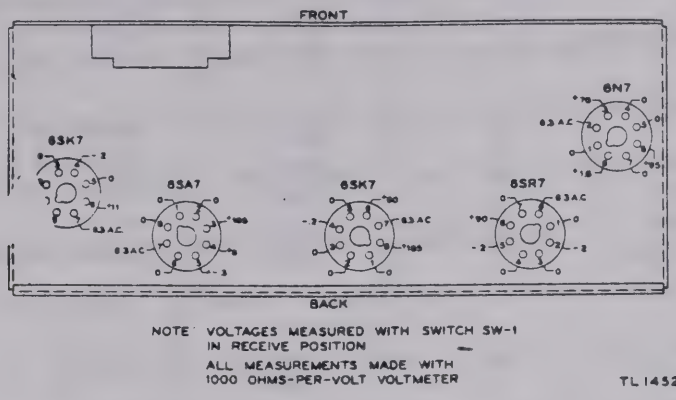

Figure 7. Radio Set AN/PRC-5, receiver chassis tube-socket layout.

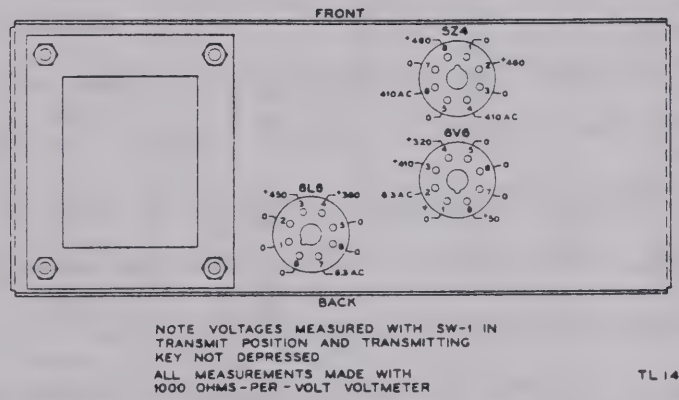

Figure 8. Radio Set AN/PRC-5, transmitter and power-supply chassis tube-socket layout.

44. POINT-TO-POINT RESISTANCE MEASUREMENTS. The following table gives average point-to-point resistance values measured from the chassis to the indicated terminals on the various vacuum-tube sockets. Make all measurements with the power cord disconnected and the various controls set as indicated in the third column of the chart.

TUBE	ELEMENT	SOCKET TERMINAL	VARIABLE CONTROL		RESISTANCE
			SYMBOL	SETTING	
V1	Grid	4	---	----	4.5 meg
	Cathode	5	---	----	0
	Screen	6	SW 1	REC.	180,000
	Suppressor	3	---	----	0
	Plate	8	SW 1	REC.	26,000
V2	Grid	8	---	----	4.5 meg
	Cathode	6	SW 3	Band 1	0.3 ohms
	Cathode	6	SW 3	Band 2	0.2 ohms
	Screen	4	SW 1	REC.	50,000
	Osc. Grid	5	---	----	100,000
	Plate	3	SW 1	REC.	28,000
V3	Grid	4	---	----	2.5 meg
	Cathode	5	---	----	0
	Screen	6	SW 1	REC.	115,000
	Suppressor	3	---	----	0
	Plate	8	SW 1	REC.	28,000
V4	Grid	2	---	----	100,000
	Cathode	3	---	----	0
	Diode	4	---	----	0
	Diode	5	---	----	550,000
	Plate	6	SW 4	ON	50,000
	Plate	6	SW 4	OFF	INF.
V5	Grid	4	---	----	1.0 meg
	Plate	3	SW 1	REC.	120,000
	Cathode	8	---	----	750
	Grid	5	---	----	250,000
	Plate	6	SW 1	REC.	60,000
V6	Grid	5	---	----	32,500
	Cathode	8	SW 5	OSC.	100,000
	Cathode	8	SW 5	AMP.	100,000
	Screen	4	SW 1	SEND	16,500
	Plate	3	SW 1	SEND	15,000
V7	Grid	5	---	----	42,000
	Cathode	8	SW 5	OSC.	100,000
	Cathode	8	SW 5	AMP.	100,000
	Screen	4	SW 1	SEND	18,000
	Plate	3	SW 1	SEND	16,000
V8	Plate	4	---	----	45 ohms
	Plate	6	---	----	50 ohms
	Cathode	8	SW 1	OFF	15,000
	Cathode	8	SW 1	REC.	35,000
	Cathode	8	SW 1	SEND	15,000

SECTION V

SUPPLEMENTARY DATA

45. RESISTOR AND CAPACITOR COLOR-CODE CHARTS. Several systems are in use for marking the values of resistance and capacitance. Some resistors and capacitors have their values stamped on, but in many cases colored bands and dots are used instead. The following charts provide a means for determining the values of resistors and capacitors from the color markings on them.

a. The Three-dot Color Code for Mica Capacitors. (1) This code is gradually being replaced by more involved codes. The basis of this code (fig. 9) is a series of three colored dots which indicate the capacitance in micromicrofarads. Two auxiliary colored dots indicating the voltage rating and the capacitance tolerance are sometimes added. Usually an arrow is molded or stamped on the case of the capacitor to indicate the sequence in which the dots are to be read. Dots 1 and 2 show the first two digits of the capacitance in micromicrofarads, while dot 3 indicates the decimal multiplier to be used. As an example, a 0.006-microfarad capacitor (6,000 micromicrofarads) is marked by the three dots in sequence, as follows:

blue (6), black (0), red (100).

(2) When the dot indicating tolerance is used, it is usually located above or below the third (decimal multiplier) dot. The color of the tolerance dot corresponds to tolerance between plus or minus 1 percent and plus or minus 20 percent. For example: a green tolerance dot is used on capacitors having a tolerance of plus or minus 5 percent (fig. 9).

(3) When the voltage dot is used, it is located above or below the first (first digit) dot. According to the code of figure 9, the various colors denote the d-c working voltage.

(4) Both of the auxiliary dots are omitted for capacitors having a tolerance

3-DOT COLOR CODE CHART

For Capacitors

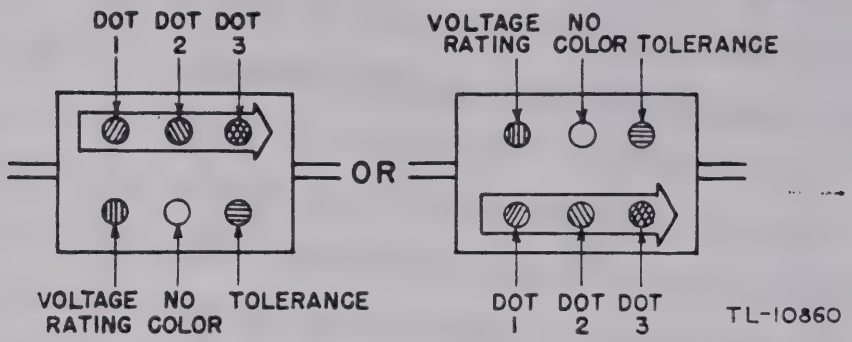

Figure 9. Molded-mica capacitors, three-dot color code.

COLOR	1st Dot	2nd Dot	3rd Dot	*Tolerance*	*Voltage Rating*
	1st Digit	*2nd Digit*	*Decimal Multiplier*		
Black	0	0	1	20%	
Brown	1	1	10	1%	100v.
Red	2	2	100	2%	200v.
Orange	3	3	1,000	3%	300v.
Yellow	4	4	10,000	4%	400v.
Green	5	5	100,000	5%	500v.
Blue	6	6	1,000,000	6%	600v.
Violet	7	7	10,000,000	7%	700v.
Gray	8	8	100,000,000	8%	800v.
White	9	9	1,000,000,000	9%	900v.
Gold	...	...	0.1	5%	1000v.
Silver	...	...	0.01	10%	2000v.
Body	...	...	.....	20%	*

*When no Color is indicated the Voltage Rating may be as low as 300 volts.

of plus or minus 20 percent, and a d-c working voltage rating which is the lowest used for that type and size of capacitor.

(5) When no color is indicated, the voltage rating may be as low as 300 volts.

b. The RMA Code for Mica Capacitors. The RMA (Radio Manufacturers Associ-

RMA STANDARD 6-DOT COLOR CODE CHART
For Capacitors (Molded Mica)

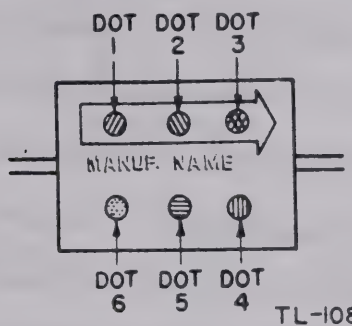

Figure 10. Molded-mica capacitors, RMA six-dot color code.

Color	1st Dot	2nd Dot	3rd Dot	4th Dot	5th Dot	6th Dot
	1st Digit	*2nd Digit*	*3rd Digit*	*Decimal Multiplier*	*Tolerance*	*Voltage*
Black	0	0	0	1	....	....
Brown	1	1	1	10	1%	100v.
Red	2	2	2	100	2%	200v.
Orange	3	3	3	1,000	3%	300v.
Yellow	4	4	4	10,000	4%	400v.
Green	5	5	5	100,000	5%	500v.
Blue	6	6	6	1,000,000	6%	600v.
Violet	7	7	7	10,000,000	7%	700v.
Gray	8	8	8	100,000,000	8%	800v.
White	9	9	9	1,000,000,000	9%	900v.
Gold	...	...	...	0.1	5%	1,000v.
Silver	...	...	...	0.01	10%	2,000v.
Body	...	...	...	...	20%	500v.

ation) code is illustrated in figure 10. This code uses six colored dots with an arrow to show the sequence. The first three dots give the first three digits of the capacitance in micromicrofarads, the fourth dot (directly below the third) gives the decimal multiplier, the fifth indicates the tolerance in capacitance, and the sixth indicates the d-c working voltage. For example: a capacitor of 0.006 microfarads (6,000 micromicrofarads) plus or minus 10 percent, 800 volts d-c working voltage, would be marked: blue (6), black (0), black (0), brown (multiplier 10), silver (plus or minus 10 percent), gray (800 volts), in that order.

c. The AWS Code for Mica Capacitors. (1) The AWS (American War Standard) code for molded-mica capacitors is shown in figure 11. Like the RMA code, it makes use of six colored dots, but with somewhat different significance. The first four dots give the capacitance in micromicrofarads as follows: first significant figure, second significant figure, third significant figure, and the decimal multiplier. It will be noted that this scheme makes provision for marking units with three significant figures. However, none of the capacitors standardized under the AWS code requires more than two significant digits to specify its capacitance. The first dot on all molded-mica capacitors, marked with the AWS code, is black, and the two necessary significant figures are given by the second and third dots. As a result the black first dot becomes an important feature or identification symbol for a molded-mica capacitor marked according to the AWS code. A few examples may serve to make this clear. A 120-micromicrofarad capacitor is marked as follows: black (0), brown (1), red (2), brown (10), indicating a molded-mica capacitor of 120 micromicrofarads. A 9,100-micromicrofarad capacitor will be marked black (0), white (9), brown (1), red (100), in-

dicating 9,100 micromicrofarads. It will be noted that in each instance the first dot is black.

AMERICAN WAR STANDARD 6-DOT COLOR CODE CHART
For Capacitors (Molded Mica)

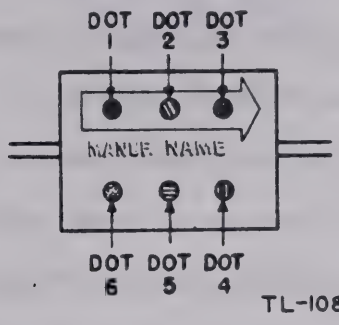

Figure 11. Molded-mica capacitors. AWS six-dot color code.

Color	1st Dot *1st Digit*	2nd Dot *2nd Digit*	3rd Dot *3rd Digit*	4th Dot *Decimal Multiplier*	5th Dot *Tolerance*	6th Dot *Characteristics*
Black	0	0	0	1	±20%	*A
Brown	1	1	1	10		B
Red	2	2	2	100	± 2%	C
Orange	3	3	3	1,000		D
Yellow	4	4	4	10,000		E
Green	5	5	5	100,000		F
Blue	6	6	6	1,000,000		G
Violet	7	7	7	10,000,000		
Gray	8	8	8	100,000,000		
White	9	9	9	1,000,000,000		
Gold	...	...	...	0.1	± 5%	
Silver	...	...	...	0.01	±10%	

*A—Ordinary Mica By-pass.
B—Same as A—Low Loss Case.
C—By-pass or Silver Mica Capacitor (±200 parts/Million/C)
D—Silver Mica Capacitor (±100 Parts/Million/C)
E—Silver Mica Capacitor (0 to +100 Parts/Million/C)
F—Silver Mica Capacitor (0 to +50 Parts/Million/C)
G—Silver Mica Capacitor (0 to −50 parts/Million/C)

(2) The fifth dot in the AWS color code indicates the capacitance tolerance in percent of rated capacitance. The sixth dot denotes characteristics of design. For example: a 0.006-microfarad (6,000 micromicrofarads) plus or minus 10 percent mica capacitor would be marked: black (0), blue (6), black (0), red (100), silver (plus or minus 10 percent), black (mica by-pass, with no temperature coefficient specified).

(3) It will be noted that this color code does not include the voltage rating. This is considered unnecessary since, with few exceptions, all capacitors marked with the AWS color code are rated at 500 d-c working volts. The exceptions, all of which are rated at 300 volts, are: AWS type CM35 capacitors with capacitances of 6,800, 7,500, and 8,200 micromicrofarads; AWS type CM40 capacitors with capacitances of 9,100 and 10,000 micromicrofarads.

d. The AWS Code for Molded-paper Capacitors. (1) the AWS color for molded-paper dielectric capacitors is shown in figure 12. Like the code for mica capacitors, referred to in subparagraph c above, it uses six colored dots, with an arrow to indicate the sequence. Units marked according to this system can readily be identified by the fact that both the first and fifth dots are always silver. The other dots are used as follows: the second dot gives the first digit of the capacitance in micromicrofarads; the third dot gives the second significant figure; the fourth dot indicates the decimal multiplier; and the sixth dot shows whether the unit has a maximum operating temperature of 167° or 185° F.

AMERICAN WAR STANDARD 6-DOT COLOR CODE CHART

FOR CAPACITORS (MOLDED-PAPER)

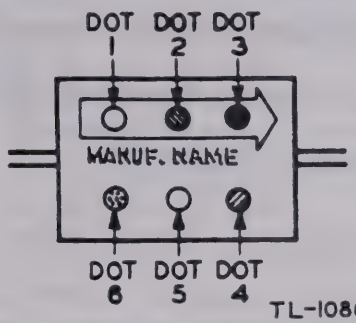

Figure 12. Molded-paper capacitors, AWS six-dot color code.

COLOR	1ST DOT	2D DOT	3D DOT	4TH DOT	5TH DOT	6TH DOT
		1ST DIGIT	2D DIGIT	DECIMAL MULTIPLIER		CHARACTERISTICS
BLACK	FIRST DOT SILVER TO INDICATE AWS PAPER CAPACITOR	0	0	1	FIFTH DOT SILVER TO INDICATE AWS PAPER CAPACITOR	*A
BROWN		1	1	10		B
RED		2	2	100		-
ORANGE		3	3	1,000		-
YELLOW		4	4	-		-
GREEN		5	5	-		-
BLUE		6	6	-		-
VIOLET		7	7	-		-
GRAY		8	8	-		-
WHITE		9	9	-		-
GOLD		-	-	-		-
SILVER		-	-	-		-

*A-MAXIMUM OPERATING TEMPERATURE IS 185° F.
B-MAXIMUM OPERATING TEMPERATURE IS 167° F.

(2) No indication of the working voltage is given by this color code. However, all AWS molded-paper capacitors have d-c working voltages between 300 and 800 volts. In general the lower voltage rating applies to units with high-capacitance ratings; the higher voltage rating applies to units with low-capacitance ratings as shown in figure 12.

e. Tubular Ceramic-dielectric Capacitors. Tubular ceramic-dielectric capacitors are sometimes marked according to the RMA color code shown in figure 13. The negative temperature coefficient is indicated by the color of the band or tips at one end of the unit; the capacitance in micromicrofarads is shown by the first three dots; the capacitance tolerance, either in percent or tenths of a micromicrofarad, depending upon the size of the unit, is indicated by the fourth and last dot. For example, a 30-micromicrofarad, plus or minus 5 percent capacitor with a negative temperature coefficient of 80 parts per million per degree centigrade would be marked as follows: tip, red (-80); first dot, orange (3); second dot, black (0); third dot, black (1); fourth dot, green (plus or minus 5 percent). The abbreviation neg. (negative) in figure 13 indicates that the capacitance varies inversely with temperature. The temperature coefficient is expressed in micromicrofarads per micromicrofarad per degree centigrade. Some capacitors are marked with a numeral instead of a color code; for example, N-030 represents 0.00003 neg. Tolerances for capacitors of 10 micromicrofarads or less are expressed in tenths of a micromicrofarad instead of percentages.

COLOR CODE CHART

For Capacitors (Tubular Ceramic)

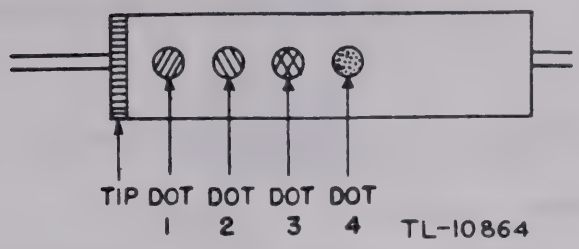

Figure 13. Tubular ceramic capacitors, RMA color code.

Color	Tip	1st Dot	2nd Dot	3rd Dot	4th Dot
	Temperature Coefficient	*1st Digit*	*2nd Digit*	*Decimal Multiplier*	*Tolerance*
Black	0	0	0	1	
Brown	.00003 Neg.	1	1	10	1%
Red	.00008 "	2	2	100	2%
Orange	.00015 "	3	3	1,000	3%
Yellow	.00022 "	4	4	10,000	4%
Green	.00033 "	5	5	100,000	5%
Blue	.00047 "	6	6	1,000,000	6%
Violet	.00075 "	7	7	10,000,000	7%
Gray		8	8	0.1	
White		9	9	0.01	10%

f. Fixed Resistors. (1) Small fixed resistors, both composition type and wire-wound, are frequently marked with colored bands and dots to indicate the resistance and tolerance. Two color codes are widely used, the RMA and the AWS. The two codes are not identical in all particulars, but they are similar in many respects. One chart, applicable to both, is shown in figure

14. It will be seen that in all cases the various combinations of body color, bands, and dots indicate the resistance to two significant figures (the first two digits), the decimal multiplier, and the percent tolerance in resistance.

(2) As illustrated by figure 14, two methods are used for indicating the resistance and tolerance:

Method 1. This method makes use of four colored bands, starting at one end of the unit, to show resistance and tolerance (A of fig. 14). The bands, reading from left to right, indicate: first significant figure, second significant figure, decimal multiplier, and percent tolerance. (The significance of the body color under this method will be explained later.)

Method 2. Several variations of this method are in use (B1, B2, and B3 of fig. 14). With all of these variations, however, the interpretation of the code is practically the same: the left end gives tolerance; the body, the first significant figure; the right end, the second significant figure; and the central dot or band, the decimal multiplier.

To illustrate, consider a 5,600-ohm, plus or minus 10-percent fixed resistor. It would be marked:

Method 1. First band, green (5); second band, blue (6); third band, red (100); fourth band, silver (plus or minus 10 percent).

Method 2. Left end, silver (plus or minus 10 percent); body, green (5); right end, blue (6); central band or dot, red (100).

RMA STANDARD COLOR CODE CHART

For Resistors

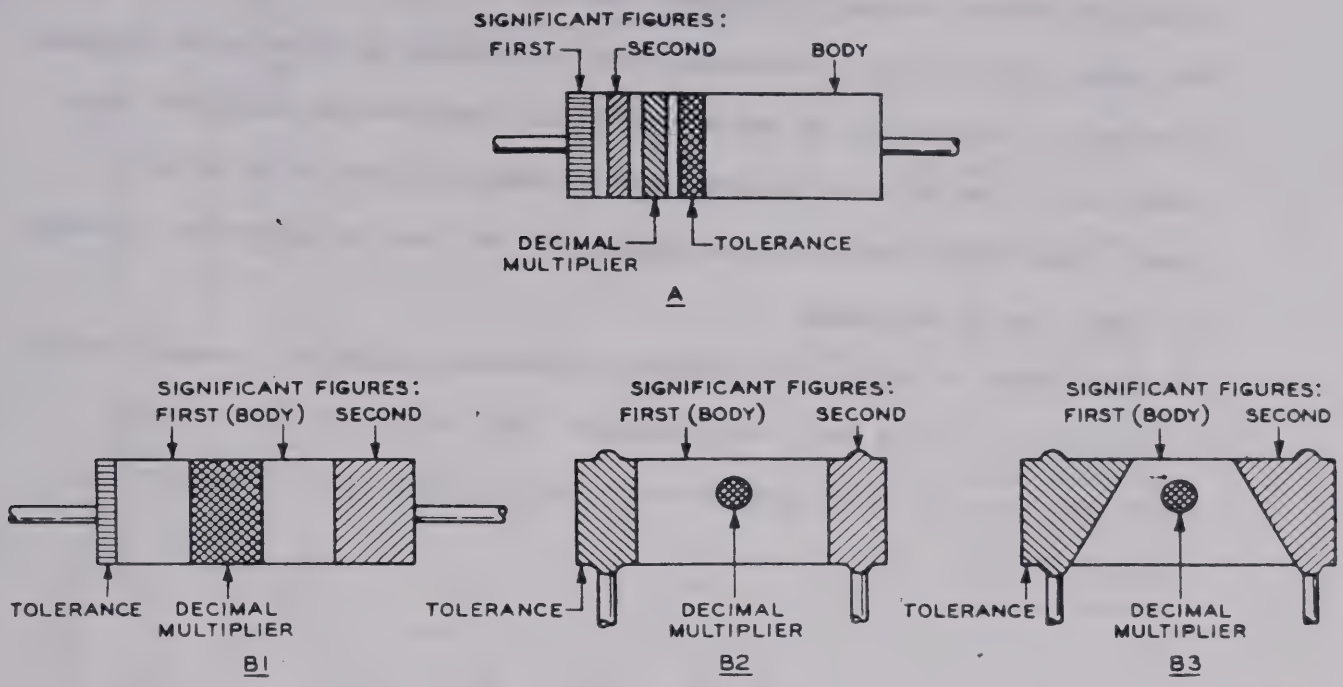

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Figure 14. Fixed resistors, RMA and AWS color codes.

COLOR	1st Band	2nd Band	3rd Band	4th Band
	1st Digit	*2nd Digit*	*Decimal Multiplier*	*Tolerance*
Black	0	0	1	
Brown	1	1	10	
Red	2	2	100	
Orange	3	3	1,000	
Yellow	4	4	10,000	
Green	5	5	100,000	
Blue	6	6	1,000,000	
Violet	7	7	10,000,000	
Gray	8	8	100,000,000	
White	9	9	1,000,000,000	
Gold	...	...	.....	± 5%
Silver	...	...	.....	±10%
No Color		...	.....	±20%

In method 1, where the body color plays no part in indicating resistance or tolerance, it may be used to indicate the type of resistor unit. Under the RMA code, a black body is frequently used to indicate an uninsulated composition unit; a tan, olive, or white body usually indicates an insulated wire-wound unit. The AWS code requires that an insulated unit using method 1 have a black body; the body of an uninsulated unit may be any color, although a natural tan is preferred.

(3) When there is doubt as to whether a particular resistor is composition or wire-wound, it is well to remember that any resistor of 100 ohms or less is most likely wire-wound, and is probably wound inductively.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
C1	3D9101-31	CAPACITOR: ceramic; 10-mmf ± 10%; 500 volts dc (working); Durez-coated.	1						*
C2	3D9030V-7.1	CAPACITOR: variable; trimmer; 3- to 30-mmf.	3						*
C3	3D9100-15A	CAPACITOR: ceramic; 100-mmf ± 10%; 500 volts dc (working); Durez-coated.	5						*
C4, C11, and C15	3D9150V-21	CAPACITOR ASSEMBLY: variable; 3-gang 9- to 150-mmf; and 3-gang trimmer 5-mmf, complete with gear and worm drive.	1						*
C5, C12, and C14									
C6	3DA20-13.1	CAPACITOR: paper; 0.02-mf; tubular; 600 volts dc (working).	2						*
C7	3DA50-1	CAPACITOR: paper; 0.05-mf; tubular; 600 volts dc (working).	5						*
C8	3D9100-15A	Same as C3.							*

* Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5. (contd).

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
C9	3D9030V-7.1	Same as C2.							*
C10	3D9100-15A	Same as C3.							*
C11		Part of C4 assembly.							*
C12		Part of C4 assembly.							*
C13	3DA50-1	Same as C7.							*
C14		Part of C4 assembly.							*
C15		Part of C4 assembly.							*
C16, C17	3DB20-29	CAPACITOR: electrolytic; 2-section; 20-mf; 450 volts dc (working).	1						*
C18	3D9020-5.1	CAPACITOR: ceramic; 20-mmf ± 10%; 500 volts dc (working); Durez-coated.	1						*
C19	3D9030V-7.1	Same as C2.							*
C20	3DA2-103	CAPACITOR: mica; 0.002-mf; 600 volts dc (working).	2						*

*Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
C21	3DB10-57	CAPACITOR: electrolytic; 2-section; 10-mf; 450 volts dc (working); (sections connected in parallel).	1						*
C23	3DA50-1	Same as C7.							*
C24	3D9050-49	CAPACITOR: ceramic; 50-mmf ± 10%; 500 volts dc (working); Durez-coated.	3						*
C25	3D9050-49	Same as C24.							*
C26	3DA50-1	Same as C7.							*
C27	3D9500-89	CAPACITOR: ceramic; 500-mmf ± 10%; 500 volts dc (working); Durez-coated.	2						*
C28	3DA50-1	Same as C7.							*
C29	3D9250-51	CAPACITOR: ceramic; 250-mmf ± 10%; 500 volts dc (working); Durez-coated.	1						*
C30	3DB100-10	CAPACITOR: electrolytic; 100-mf; 6 volts dc (working).	1						*

* Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
C31	3DKA-51	CAPACITOR: paper; 0.003-mf ± 20%; 600 volts dc (working).	1						*
C32	3D9250-46	CAPACITOR: ceramic; 250-mmf ± 20%; 500 volts dc (working); Durez-coated.	1						*
C33	3DA20-13.1	Same as C6.							*
C34	3DA100-16	CAPACITOR: paper; 0.1 mfd tubular; 400 volts dc (working).	1						*
C35	3DA287.1	CAPACITOR: paper; 0.002-mf; tubular; 600 volts dc (working).	1						*
C36	3DA5-38	CAPACITOR: mica; 0.005-mf; 600 volts dc (working).	7						*
C37	3DA2-103	Same as C20							*
C39	3D9500-89	Same as C27.							*
C40	3D9140V-3	CAPACITOR: variable; 140-mmf; 2000 volt.	3						*
C41	3D9140V-3	Same as C40.							*

*Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
C42	3DA5-38	Same as C36.							*
C43	3DA5-38	Same as C36.							*
C44	3DA5-38	Same as C36.							*
C45	3D9100-15A	Same as C3.							*
C46	3DA5-38	Same as C36.							*
C47	3D9140V-3	Same as C40.							*
C48	3D9100-15A	Same as C3.							*
C49	3DA5-38	Same as C36.							*
C50	3DA5-38	Same as C36.							*
C51	3D9050-49	Same as C24.							*
ANT	3Z737-17	BINDING POST: bakelite head; (antenna).	1						*
GROUND	3Z737-17	BINDING POST: bakelite head; (ground).	1						*

* Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
F	3Z2602.1	FUSE: 2-amp; 250 volts; (Littelfuse type No. 8AG).	1	2					*
F	3Z3275-8	FUSE EXTRACTOR POST: bakelite; brass; tinned terminals.	1						*
J1	2Z5534	JACK JK-34: 2-conductor; accommodates Plug PL-55.	2						*
J2	2Z5534	Same as J1.							*
L1	3C302V	COIL: (antenna); for receiver band 2.	1						*
L2	3C302V-1	COIL: (antenna); for receiver band 1.	1						*
L3	3C326-100	COIL: r-f choke; National type R-100.	3						*
L4	3C1084Z4-1	COIL: r-f amplifier; for receiver band 2.	1						*
L5	3C1084Z4	COIL: r-f amplifier; for receiver band 1.	1						*

* Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

NOTE: Order maintenance parts by stock number, name and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
L6	3C1081-20D	COIL: oscillator; for receiver band 2.	1						*
L7	3C1081-20E	COIL: oscillator; for receiver band 1.	1						*
L8	2Z9641.67	TRANSFORMER ASSEMBLY: 1st i-f amplifier; in shielded can.	1						*
L9	2Z9641.68	TRANSFORMER ASSEMBLY: 2d i-f amplifier; in shielded can.	1						*
L10	2Z9644.5	COIL ASSEMBLY: (beat-frequency oscillator); in shielded can.	1						*
L11	3C326-100	Same as L3.							*
L12,L14	3C1081-20B	COIL ASSEMBLY: band C, for transmitter oscillator or power amplifier.	1						*
L12,L14	3C1081-20C	COIL ASSEMBLY: band D, for transmitter oscillator or power amplifier.	2						*

* Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
L13	3C326-100	Same as L3.							*
L14	3C1081-20A	COIL ASSEMBLY: Band B, for transmitter power amplifier.	1						*
L12,L14	2Z8675.55	SOCKET ASSEMBLY: ceramic; plug-in; complete with stand-off insulators.	2						*
L16	3C342-11	COIL: choke; filter for power supply.	1						*
M	3F915-30	AMMETER: 0-150 ma dc; 2-inch diam.	1						*
P1	2Z5985.4	LIGHT ASSEMBLY: pilot; green jewel; miniature bayonet socket.	1						*
P1	2Z5891-4	JEWEL HOLDER: green.	1						*
P2	2Z5985.4	LIGHT ASSEMBLY: pilot; white jewel; miniature bayonet socket.							*
P2	2Z5891-4	JEWEL HOLDER: white.	1						*

* Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

NOTE: Order maintenance parts by stock number, name and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
R1	3Z6802-17	RESISTOR: carbon; ½ watt; 2-meg ± 20%; AWS type RC21BE205M.	3						*
R2	3Z6750-47	RESISTOR: carbon; ½ watt; 500,000-ohm ± 10%; AWS type RC21BE504J.	1						*
R3	3Z6725-10	RESISTOR: carbon; ½ watt; 250,000-ohm ± 10%; AWS type RC21BE244J.	2						*
R4	3Z6802-17	Same as R1.							*
R5	3Z6625-53	RESISTOR: carbon; 2 watt; 25,000-ohm ± 10%; AWS type RC41BE243J.	1						*
R6	3Z6700-61	RESISTOR: carbon; ½ watt; 100,000-ohm ± 10%; AWS type RC21BE104K.	4						*
R7	3Z6680-2.1	RESISTOR: carbon; 1 watt; 80,000-ohm ± 10%; AWS type RC31BE823J.	1						*

* Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
R8	3Z6650-78	RESISTOR: carbon; ½ watt; 50,000-ohm ± 20%; AWS type RC21BE473K.	1						*
R9	3Z6700-61	Same as R6.							*
R10	3Z6625-84	RESISTOR: carbon; ½ watt; 25,000-ohm ± 10%; AWS type RC21BE243J.	2						*
R11	3Z6640-14	RESISTOR: carbon; 1 watt; 40,000-ohm ± 10%; AWS type RC31BE393J.	1						*
R12	3Z6725-10	Same as R3.							*
R13	3Z6075-8	RESISTOR: carbon; ½ watt; 750-ohm ± 10%.	1						*
R14	3Z6801-54	RESISTOR: carbon; ½ watt; 1-meg ± 20%; AWS type RC21BE105M.	1						*
R15	3Z6700-61	Same as R6.							*
R16	2Z7272-1	POTENTIOMETER: 500,000-ohm; (volume control).	1						*
R17	3Z6802-17	Same as R1.							*

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d echn	4th echn	5th echn	Depot stock
R18	3Z6610-108	RESISTOR: vitreous enamel; 10 watt; 10,000-ohm.	1						*
R19	3Z6630-67	RESISTOR: vitreous enamel; 10 watt; 30,000-ohm ± 10%.	1						*
R20	3Z6720-6	RESISTOR: carbon; ½ watt; 200,000-ohm ± 10%.	2						*
R21	3Z6640-6	RESISTOR: vitreous enamel; 5 watt; 40,000-ohm ± 10%.	2						*
R22	3Z6560-6	RESISTOR: wire-wound; 10 watt; 6,000-ohm ± 10%.	1						*
R23	3Z6700-61	Same as R6.							*
R24	3Z6040-53	RESISTOR: vitreous enamel; 5 watt; 400-ohm ± 10%.	1						*
R25	3Z6200-97	RESISTOR: carbon; 2 watt 2,000-ohm ± 20%; AWS type RC41BE182K.	1						*
R26	3Z6625-84	Same as R10.							*

* Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5. (contd).

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
R27	3Z6570-19	RESISTOR: carbon; ½ watt; 7,000-ohm ± 10%; AWS type RC21BE682J.	1						*
R28	3Z6640-6	Same as R21.							*
R29	3Z6610-16	RESISTOR: carbon; 2 watt; 10,000-ohm ± 10%; AWS type RC41BE103K.	1						*
R30	3Z6040-1	RESISTOR: carbon; 1 watt; 400-ohm ± 10%; AWS type RC31BE391J.	1						*
R31	3Z6005-34	RESISTOR: wire-wound; ½ watt; 50-ohm ± 10%.	1						*
R32	3Z6640-35	RESISTOR: carbon; ½ watt; 40,000-ohm ± 10%; AWS type RC21BE393J.	1						*
R33	3Z6250-50	RESISTOR: wire-wound; 10 watt; 2,500-ohm ± 10%.	1						*
R34	3Z6720-6	Same as R20.							*

* Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
SW1	3Z9825-58.23	SWITCH: ceramic; 4-circuit; 3-position; (off-rec-send).	1						*
SW2	3Z9857.27	SWITCH: toggle; double-pole, double-throw; 125 volts.	1						*
SW3	3Z9827.33	SWITCH: band.	1						*
SW4	3Z9835-1	SWITCH: snap; single-pole, single-throw; (BFO ON-OFF).	1						*
SW5	3Z9835-1.1	SWITCH: snap; single-pole, double-throw; (OSC-AMP).	1						*
TR	2Z9608-15	TRANSFORMER: power; 110-220 volt primary.	1						*
	3E7186-8	CORD: a-c line; 6 feet; 2-conductor; No. 18 wire; color coded with rubber jacket.	1						*
	3E1605-6.5	CORD CD-605: 2-conductor; 6½ feet; with Transformer C-410 and Plug PL-55.	1						*

* Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
	3E1201A	CORD CD-201-A: 2-conductor; 5 feet; Plug PL-55 on one end and terminals on other end for Key J-47.	1						*
	2Z3543.8	CRYSTAL HOLDER FT-243: set of 1 each for all authorized frequencies.	6						*
	2B830( )	HEADSET HS-30-( ): component. HEADSET HS-30-( ): repair parts.	1						*
	3Z3447.1	KEY J-47: telegraph; complete with Cord CD-201-A.	1						*
	2ZK5748.15	KNOB: receiver.	1						*
	2Z5848.19	KNOB WITH POINTER: bakelite.	5						*
	6Z7565.3	PLUG: 2-connector; parallel bladed; rubber; (power cord).	1						*
	2Z7155	PLUG PL-55: 2-conductor.	3						*

* Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d echn	4th echn	5th echn	Depot stock
	2ZK8674.17	SOCKET: tube; octal; ceramic.	3						*
	2Z8650.1	SOCKET: tube; octal; bakelite; with ring containing 3 grounding lugs.	5						*
	2ZK8650.6	SOCKET: crystal holder; molded phenolic.	1						*
	2Z8675.55	SOCKET ASSEMBLY: plug-in; ceramic; complete with stand-off insulators; National type XB-16.	2						*
	2Z5952	LAMP: 6-8 volts; 0.15 amp; bayonet base; GE type 47.	1	2					*
	2Z5879-2	LAMP: 2 volts; 0.06 amp; bayonet base; GE type 48.	1	2					*
	2J5Z4	TUBE JAN 5Z4: (VT-74).	1	1					*
	2J6L6	TUBE JAN 6L6: (VT-115).	1	1					*
	2J6N7	TUBE JAN 6N7: (VT-96).	1	1					*

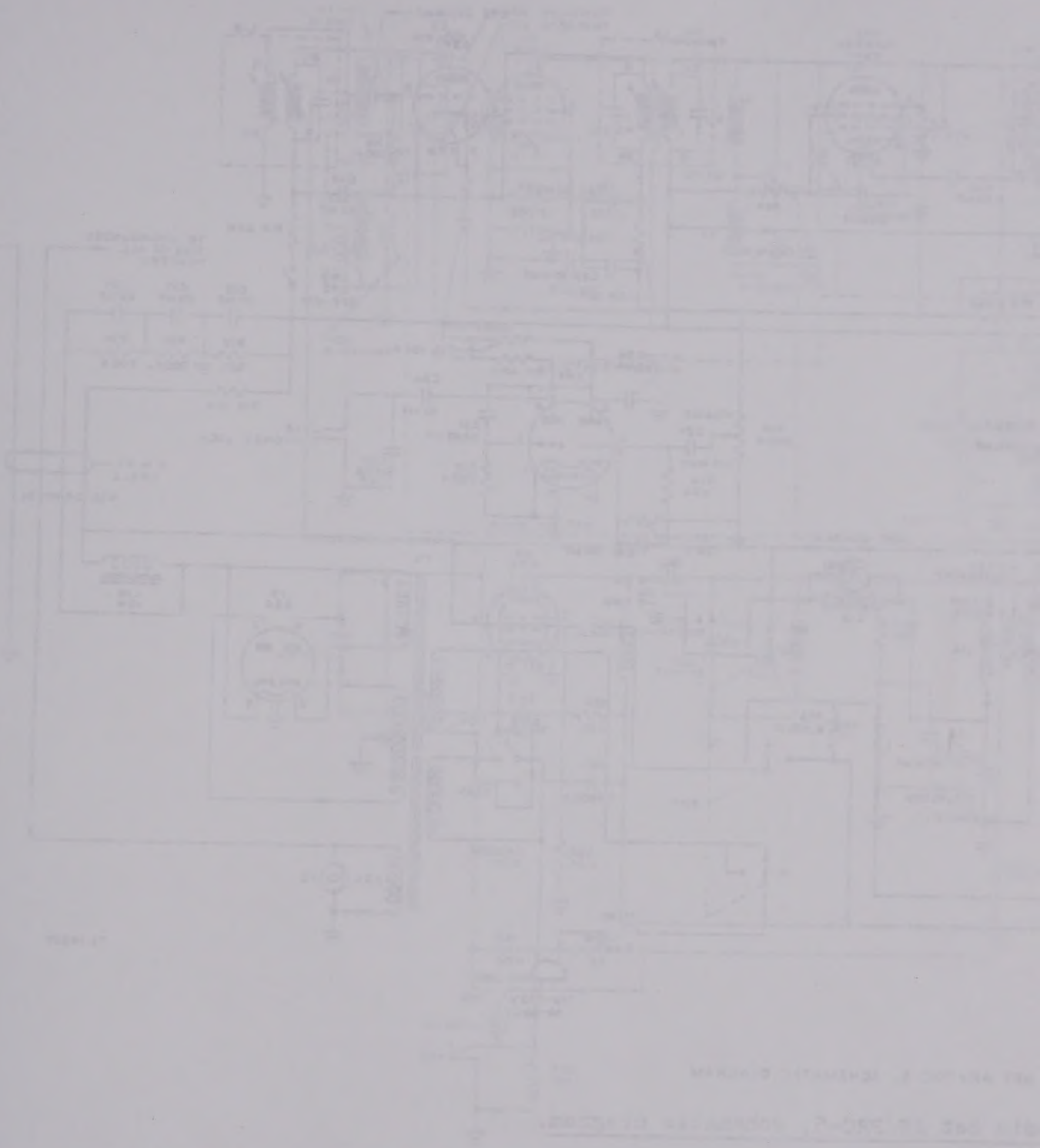
* Indicates stock available.

46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
	2J6SA7	TUBE JAN 6SA7: (VT-150).	1	1					*
	2J6SK7	TUBE JAN 6SK7: (VT-117).	2	2					*
	2J6SR7	TUBE JAN 6SR7: (VT-223).	1	1					*
	2J6V6	TUBE JAN 6V6: (VT-107).	1	1					*

* Indicates stock available.

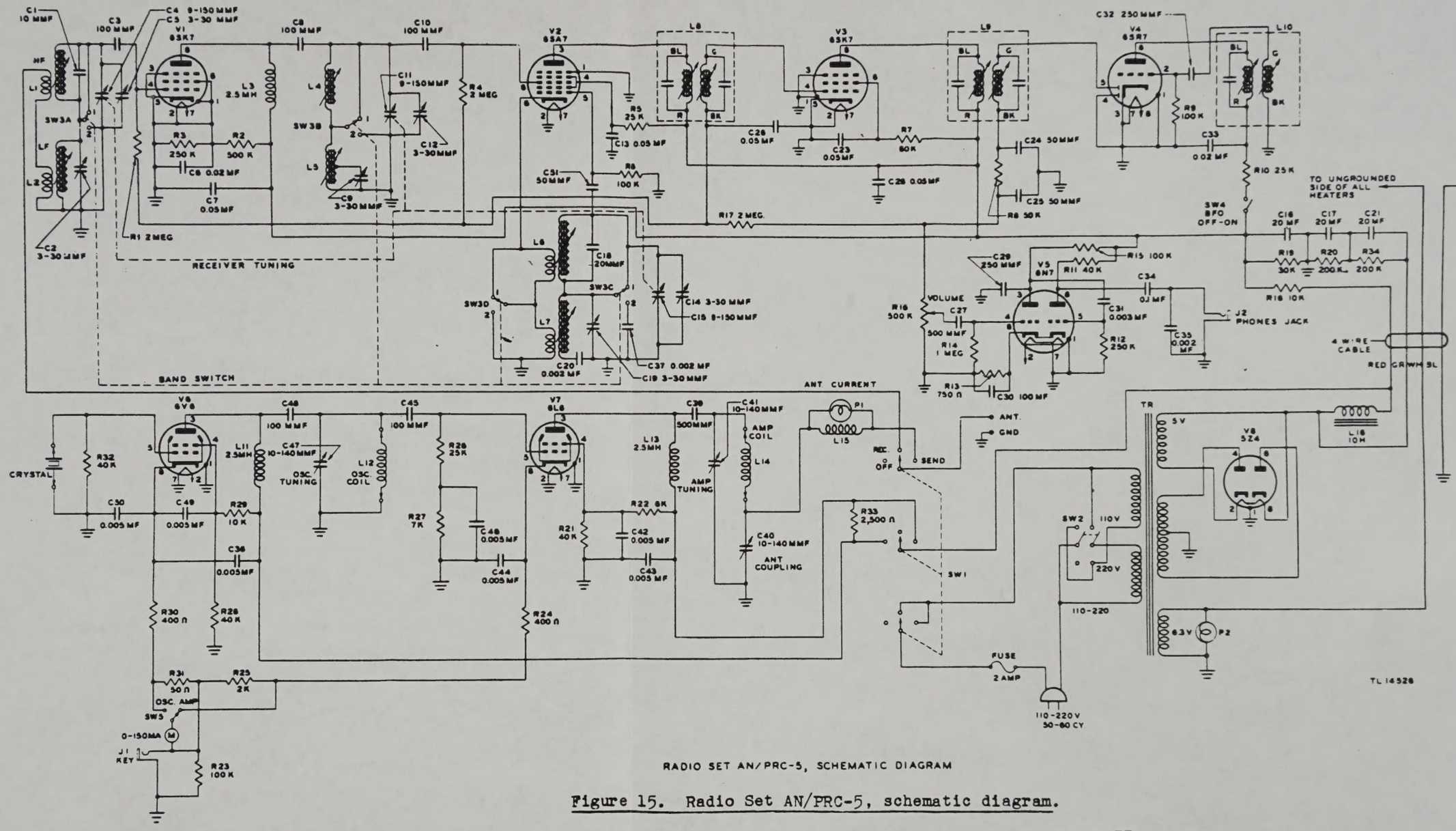


46. MAINTENANCE PARTS LIST FOR RADIO SET AN/PRC-5 (contd).

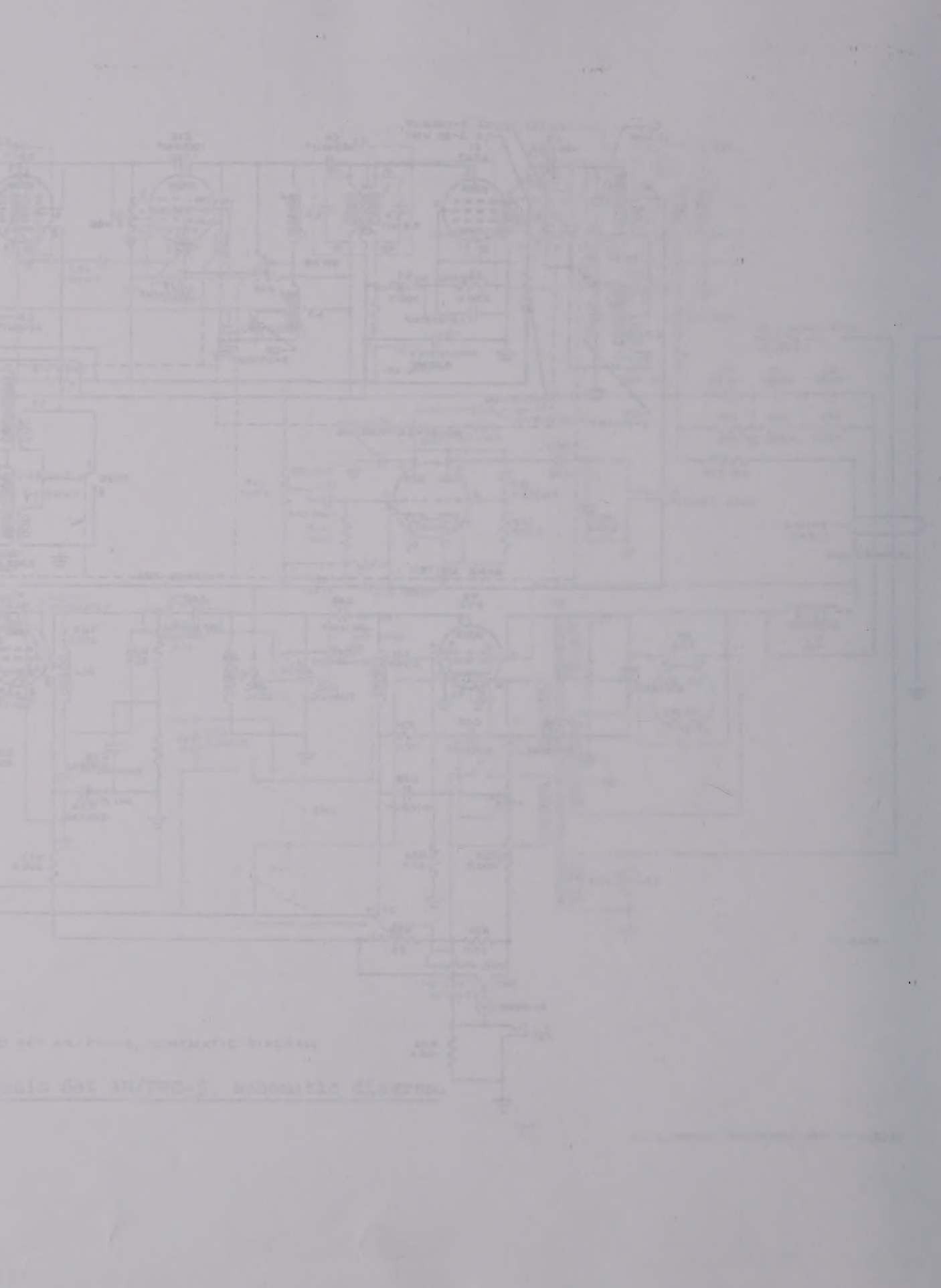
NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts listed can be requisitioned.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per equip	Running spares	Orgn stock	3d echn	4th echn	5th echn	Depot stock
	2J6SA7	TUBE JAN 6SA7: (VT-150).	1	1					*
	2J6SK7	TUBE JAN 6SK7: (VT-117).	2	2					*
	2J6SR7	TUBE JAN 6SR7: (VT-223).	1	1					*
	2J6V6	TUBE JAN 6V6: (VT-107).	1	1					*

* Indicates stock available.



RADIO SET AN/PRC-5, SCHEMATIC DIAGRAM

Figure 15. Radio Set AN/PRC-5, schematic diagram.

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